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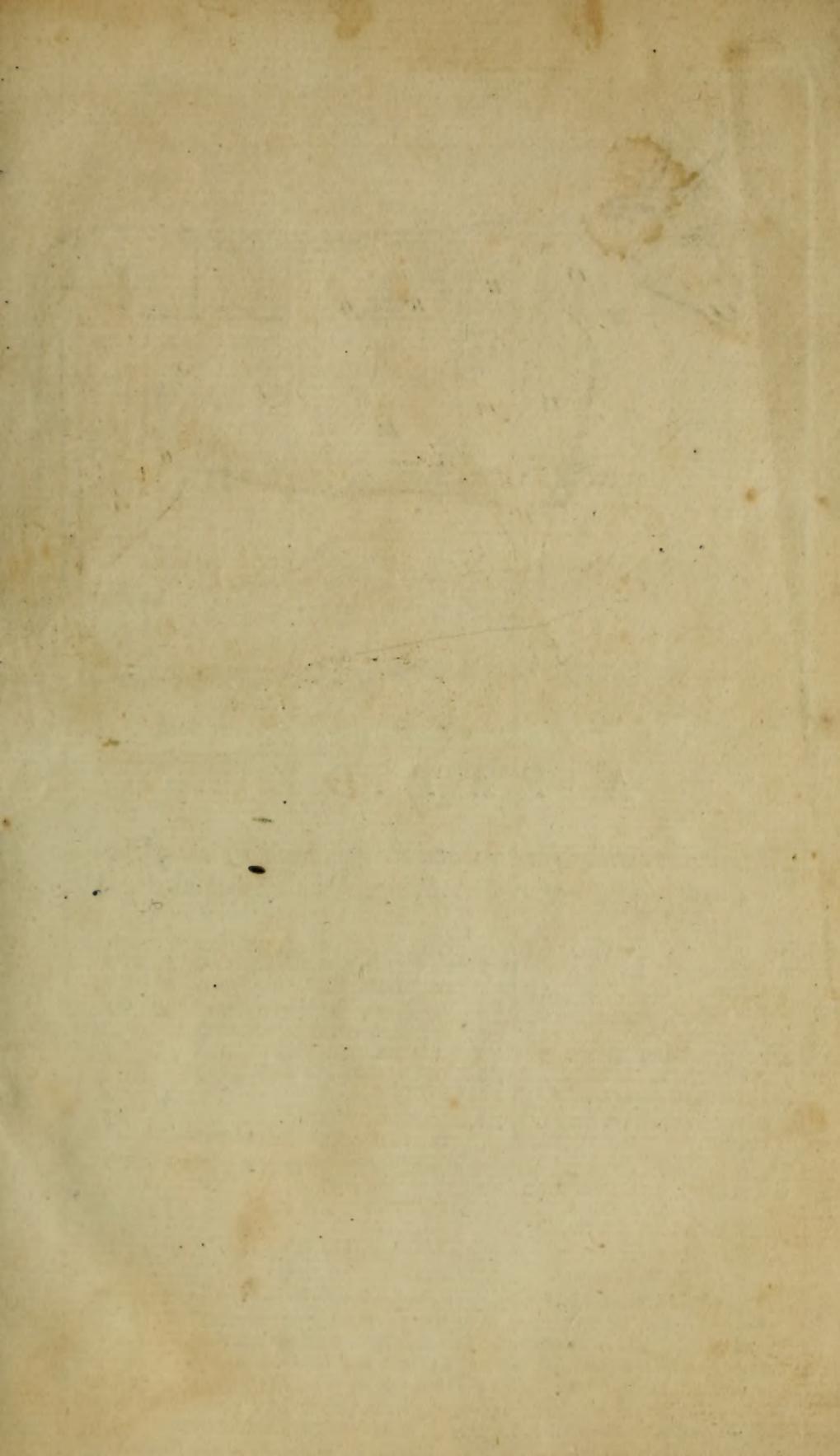
Wm. A. Winston

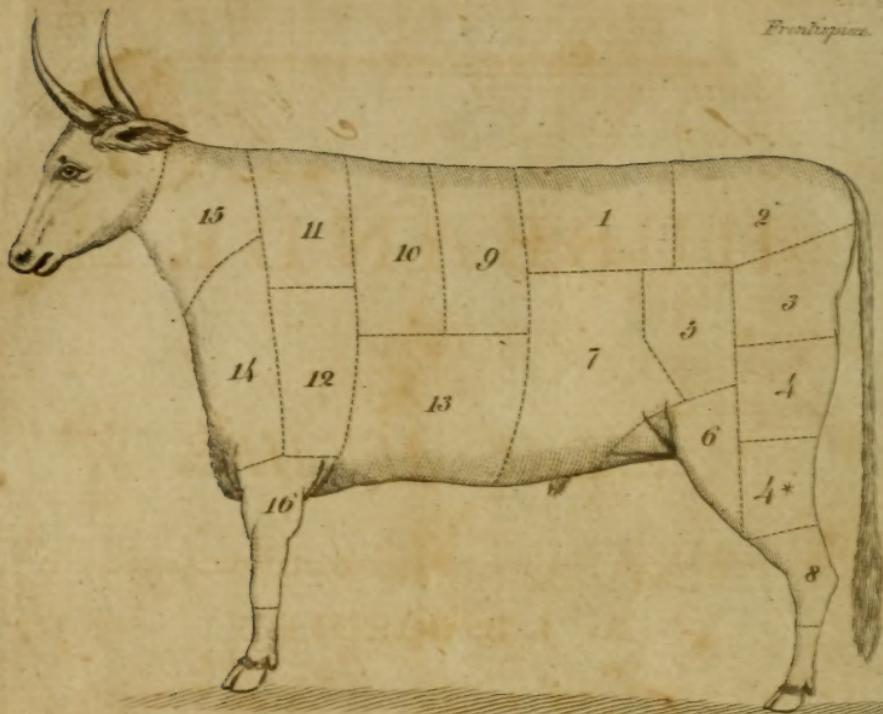
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A F A T O X.

The London cutting Names; and Proportioned Prices of the Pieces; according to Mr. Campbell, in 17 Annal.

No.	Sterling.	d.	c. m.	No.	Sterling.	d.	c. m.
1. Sirloin,	5½	10·2		9. Fore Rib, containing five,	5½	10·2	
2. Rump,	5½	10·2		10. Middle Rib, contg. four,	4½	8·3	
3. Etch Bone,	4	7·4		11. Chuck, containing three,	3½	6·5	
4. Buttock,	4½	8·3		12. Shoulder, or leg of mutton piece growing on the chuck & part of the brisket	3½	6·5	
4*. Mouse Buttock,	3	5·3		13. Brisket,	4	7·4	
5. Veiny Piece,	4	7·4		14. Clod,	3	5·3	
6. Thick flank, part growing under the fat of the buttock,	4	7·4		15. Sticking piece (neck) part growing under part of the clod,	2	3·7	
7. Thin Flank,	4	7·4		16. Shin,	1½	2·6	
8. Leg,	1½	2·6		—			
9. Pieces in hind quarter,				8. Pieces, in fore quarter.			

The whole beef cuts into 34 pieces: the head, tongue and feet omitted.

On application by Mr. Campbell to the principal gentlemen of the trade, in the best markets of London, he was enabled to send to Mr. Young, a rough outline sketch of a good ox, with the names and proportionate prices of all the pieces. He could not describe the pieces by the lines better than on the drawing, as some pieces grow under or partly under other pieces. This is copied from Mr. Campbell's; but the off horn stands rather too distant at the root, from the near horn—too much behind it; and the legs are rather too long.

HUSBANDRY

AND

RURAL AFFAIRS.

BY J. B. BORDLEY.

Still let me COUNTRY CULTURE scan:
My FARM's my Home: " My Brother, MAN :
" And GOD is every where."

THE SECOND EDITION WITH ADDITIONS.

PHILADELPHIA:

PRINTED BY BUDD AND BARTRAM,

FOR THOMAS DOBSON, AT THE STONE HOUSE,
NO. 41, SOUTH SECOND STREET.

1801.

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P R E F A C E.

THE writings of the respectable Mr. TULL first excited the author's attention to agriculture: but, to Mr. YOUNG he is chiefly indebted for his knowledge of its present state and the modes of practice in Europe. It was a happy first thought which led Mr. Young to make his farming-tours, for collecting *facts* of the then existing state of husbandry in England: the rest followed; and the world has the fruits of his labours, his ingenuity, and his public spirit.

On

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On the turn of middle age and whilst gradually quitting public employments, the author sat down on a farm in Maryland, and became enthusiastically fond of husbandry. Farmers in the neighborhood informed him of their modes of practice ; but they taught him nothing of the principles of the art. Whilst they knew how to practise in the manner common to the country, he knew neither principles nor practice ; but began however with observing their practices, which he continued to imitate ; until gaining information from a number of instructive experiments, he was encouraged to deviate from some of them ; and became more and more assured that great improvements might be made by professed farmers, in this first of all employments, if they could be brought to relinquish the worst of their habits.

It was hoped the Society of Agriculture in Philadelphia would have induced farmers, in Pennsylvania at least, to seek improvement

provement in better practices. Success was chiefly looked for from persons who becoming farmers had been of other professions (soldiers, sailors, &c.) and were never trained to follow mere habits, unexamined ; and moreover whose support should not altogether depend on the produce of their farms ; but who with minds unshackled, would practise upon well digested and approved principles tested by experiments.

Little essays have been occasionally written and dispersed amongst his friends ; which, with others hitherto remaining in manuscript pertaining also to the concerns of husbandmen and country affairs, compose the present work. If fortunately they shall induce improvements and better attentions, for assuring competency with domestic and social comforts, his first wish will be accomplished.

P R E F A C E

To the Second Edition.

TH E former edition of the Essays and Notes on Husbandry and Rural Affairs being disposed of, and a new edition called for, and the Editor having received from the Author considerable additions, the contents of many pages, upwards of eighty, which are chiefly dispersed in the work as is most suitable to the respective subjects, this second edition is now offered to the public, embellished with two additional copperplates: but, that the price might not be increased, the work is printed on a smaller type than the former.

The frontispiece to the present edition, will be particularly valuable to country families, in the copy of a drawing, given of a fat ox, by the attentive Mr. *Campbell*, with marks pointing out from the London practice, the method of cutting up a beef to the best advantage; also with the names and proportionate prices of the pieces, from the sirloin to the hock—a portion of information which is greatly desired in the country. *See the 17 An.*

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ESSAYS AND NOTES

ON

HUSBANDRY, &c.

" Agriculture is confessedly the most useful of all the Arts. Bodily health
" and activity of mind are eminently promoted by the Exertions it re-
" quires. It is better calculated than other Occupations, for preserving
" the simplicity of manners, and purity of morals, which constitute the
" surest Basis of a prosperous Tranquillity in States."

ANDERSON.

SYSTEMS AND ROTATIONS IN FARMING BUSINESS.

FARMERS blessed with dispositions to improve on what they know, will acknowledge there are great deficiencies in the modes of common farming, for want especially of well digested systematic applications of labour with a proper choice of crops; and that, there are great irregularities and misapplication of labour and attentions in the practices of husbandmen.

A

It

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It is not long since we began to read and talk of *rotations of crops*, without applying any adequate meaning to the expression. It seems as if farmers, in common, understand little more by it than the practices or courses, irregular and wild as they may be, in common farming. They indeed are not apt to elevate their minds to views of improvement; but rather set themselves against it: for, improvement implies new labour and attention; although it may be in lieu of and less than the usual course of labour; and they cannot give up their old habits, already and insensibly acquired, with little expense of thought.

A *recurring rotation of crops* is the completion of as many years crops of the same kinds, in regular changes from field to field, as there are fields cultivated; and which form a cycle or round of such crops as will recur in the same order for ever. But where, for instance, there are seven fields, if the farmer proceeds on the designed system yet stops short of the seven years, it is not a *rotation*, but is only a *course* of crops for so many years as it has been continued; for there is no cycle or round of crops completed.

Experience teaches, and a little reflection on viewing designs of systematic recurring rotations of crops and business assures thinking persons, that well chosen

chosen systematic business must have important advantages over random practices and courses.

GRASS ROTATIONS.

A valuable friend of the social virtues, the late Mr. *Rigal*, a gentleman from Manheim in Germany, asked me how he should cultivate a small farm near so considerable a town as Philadelphia. On which the following was written for him; and it is here inserted entire, because of the principles and intimations contained in it, which may be useful, as well as the system of business proposed.

“ —— Commerce feeds the passions :
“ Agriculture calms them.”

Intending to retire from the bustle of a town life, to a small seat, a few miles in the country, consisting of a comfortable house, offices, garden, and 56 acres of arable land having a clay-loam rather impoverished, but knowing nothing of husbandry from experience, and but little in theory, I consult practical farmers; who assure me labour is scarce, hirelings are with difficulty managed, even by experienced husbandmen, and that many peculiar attentions with much of complicated work are appendant to a *grain farm*. In short, that the most simple, the most pleasing, and the most advantageous use that I can apply my land to, is to keep it in grass.

It is also said that some such mode as is offered in the design below, is best adapted to my talents and situation. It is my wish, however, to have it approved or amended by experienced persons, or that a better be proposed.

DESIGN.

No kind of grain is to be cultivated. No horse, ox, cow or other beast is to graze on pasture. They are to be kept up the year through. There then will be little need of division fences. Such as are on the place may be removed, and the out fence be made perfect. The fields will then be under one general inclosing fence ; and exhibit a beautiful unit of grass, unbroken by fences, but dotted here and there with clumps of trees, and marked off in equal divisions by headlands or turnings, and cultivated as below.*

The

* The trees may be locusts, sugar-maples, black mulberries, black-walnuts, black-gums, dogwoods, sassafrasses : none whereof materially injure grass growing under them. If it should be requisite to guard against bleak winds, divisions may be formed with hedges, or only trees planted close in rows. Other trees may be two or three weeping-willows, for their singularity ; the yellow willow for use. The sugar-maple is a handsome clean tree, which gives a deep shade. A grove of them, two or three acres, would give comfortable shady walks, and sugar for family use ; the making whereof would require but a short time, and be an entertaining harvest. The trees 30 feet apart, are above 48 on an acre ;

The live-stock may be two oxen for a plow, harrow, roller, and cart, occasionally; four oxen in harness for a waggon, the journies being short; and two good cows, besides carriage or saddle horses.*

Much

which at a low reckoning would yield 200 lb. of sugar an acre. Two acres, yielding 400 lb. would pay an annual rent of 30 or 40 Dollars an acre, deducting only a trifle, not so much for labour as for a short attention in the leisure month of February. From seeds, it may be 20 years before the trees yield sufficiently of sugar: but they soon form a delightful shady grove; and they grow readily from seeds. Instead of 48 trees, there may be 48 clumps of three or more sugar maples in each clump. Sugar maples growing in fields, uncrowded, give 7 lbs of sugar a tree: then clumps of 4 trees may yield 24 lbs a clump; and 48 such clumps may be reckoned to give 1150 to 1300 lbs from an acre.

* Mr. Rigal for whom this was written, lately died in easy circumstances. Others, less able, may conduct the business of their grass-farms with fewer cattle, and even without owning any, by occasionally hiring teams, for drawing hay, carrying out manures, plowing, &c. But, four oxen, a waggon, a plow, a roller and a harrow, would pay well when kept on the farm, always at command. Indeed oxen cannot be deemed costly, expensive, and in the end a dead loss, as horses are.

An ox costs	40 Dollars.
— 3 years keep, at 24	72
— 1 year ditto, and fattening	40
He gains from 4 years but partial work	160
— 4 years dung (winter and summer)	40
— fold, for	80
	—
	152 .. 280

Much of inconvenience and but little profit would attend the making butter for sale, by any other than a proprietor who is of the class of dairy people. Rather prefer buying butter and grain wanted. The *hay*, a simple unit of attention and produce, pays for them to the best advantage: and a complication of attentions is to be avoided.

Some ground for potatoes, truck-patch, and experiments will be wanted: therefore eight acres are reserved; which are to have no connection with the other fields; nor are ever to grow any corn or grain, which would require the *thrasher* to be introduced. These eight acres may contain a garden for the market, or for pleasure, according to the views of the owner.

In the first year plow up all the arable, deep as the soil will admit of. Then sow buckwheat, and plow in the plants before they produce seeds. Repeat this, for *protecting* the fallow from excessive exhalation; and for adding a *manure* to the soil as often as the buckwheat is plowed in. On the fields A and B, lay a quantity of rich *dung*: best done in the fall, on the last turning in of the buckwheat. Sow these and the other four fields with rye, for giving *hay*. When, hereafter, clover and timothy seeds are sown, rye will first *shelter* these grasses in their tender state, and then be cut and cured into *hay*.

hay. In the second year, give dung also to C and D fields; and in the third to E and F fields. I have not indeed ever seen rye-hay; but have heard farmers say, it is good in quality and the crop great.

To *dung* the whole in the first year might be beyond your power, or be very inconvenient. Therefore a third part is proposed to be dunned in each of three years: which, however, rather disadvantageously postpones, till the seventh year, the commencement of the desired course, for giving yearly two fields of rye-hay, two of clover, and two of timothy.*

For effecting rotations of recurring crops, four articles of produce, if *all annual*, would require four fields. If of *three articles* of crop, one is *annual*, as in the subsequent table, and two are *biennial*, then six fields are requisite. With fewer fields the system would be defective, and the round of crops could not be continued. For instance: if these articles

* If the ground is already in good heart, after plowing in the first sowing of buckwheat for a manure, in *July* you may sow buckwheat *for a crop*, and *clover seed* immediately on it. Thus in the very first year, a crop of *buckwheat* is gained; and in the second year a crop of *clover*, from the whole 48 acres. If the ground is suitable to *gypsum*, then restore with gypsum or limestone dust as far as the dung falls short, which will greatly reduce the postponement of the intended grass-crops.

GRASS ROTATIONS

ticles annual and biennial, as above, were cultivated in only three fields, in the seventh and eighth years there would be no clover. If of *two* articles of crop one is *annual* and the other *triennial*, then four fields are requisite.

The first six years of the above design are rather preparative to the intended round of crops (see the table). It is the seventh year which enters upon the designed and proper recurring rotation of *crops*, *manuring*, and *work*. A regular system of recurring crops and business in husbandry exists on the principles of the spiral line, as well as of the circle. This is illustrated by reading the plan diagonally, from A field in the seventh year, downward through B field 8, C field 9, &c. to F field in the twelfth year inclusive; being in all six fields, and six years; all whereof direct to "mow timothy, plow in timothy, dung, sow rye." The like of the other articles. By wrapping the paper plan or table round a cylinder, the spiral line of crops is clearly understood. The plan is also advantageously read directly downward, taking any one field at a time; and also laterally through all the fields of either year.

Though the first six years, in the system exhibited in the table, give crops, except the first year, yet they are not according to the designed variety; as they are mostly in rye-hay, instead of two fields of

of rye, two of clover, and two of timothy. But the proper course being once entered on, the intended crops will regularly recur as long as you please to continue it.

Manurings also recur in rotation and spiral order; and being frequent are applied in less quantities at a time than would be requisite after the usual lengthy delays in renewing them: and applying them *frequently in moderate quantities*, a practice nearer to the economy of nature; which instantly commits to the earth the food of plants, the means of obtaining that food, in moderate portions: not in gluts to surfeit, nor at distant intervals of time which might starve the plants.*

Not only the *crops* and *manurings*, but the *ploughings* and the work in general, recur orderly and of course, without the hazard of a wrong bias or fallible reasoning leading you into error, confusion, or ill judged and irregular practices and courses. Such are important advantages, which systematic husbandry has over random or common practices.

Your

* This method of applying manures, gradually, it may be expected will be effectual, after being for sometime repeated: but it need not prevent laying on manures in full quantities at once where they can be obtained.

Your live stock will give the dung requisite, after the third year: and beeves bought and foiled on cut green grass, will add to the dunghil.

Rye is sowed in September or October. *Clover* in Maryland, in March, by strewing the seeds on the ground which is already sown with small corn; or in on buckwheat, without any attempt to cover them. The dilated state of the ground, and the motion given to its particles by the alternate li frosts and thaws of March, and winds or suns of July, suffice for the growing of the seeds; and the sun is too feeble to injure them, sheltered as they are by the buckwheat or other cornplants; yet in some cases it may be well to run a light roller over it. Some farmers in Pennsylvania of late, prefer strewing clover seed on their wheat fields in April. For the climate of Maryland about the 20th of March seems the best time.

Timothy sown in the spring, would sometimes be injured by drought and heat of the midsummer sun, whilst in its feeble state on the loss of its grain-shelter. On the other hand, though timothy is more perfect from being sown on grain in autumn, yet it sometimes overgrows and injures the crop of winter grain. But when the grain is sown for the purpose of *hay* and *shelter* only, the objection is avoided: and autumn is generally the preferable season

season for sowing *timothy* seed. On rye being, in September, sown and harrowed in, immediately, before the soil can be settled down by time or rain, strew the *timothy* seed over it; and either *roll* it in or leave it to the crumbling of the soil in its settling with the aid of wind and rain; which in experience is found to be generally sufficient.

Clover and *timothy* grow admirably well when sown in July on *Buckwheat*. The feedling plants are thus well sheltered against the scorching sun, and will have a good length of time for growing strong for withstanding the winter's frosts.

Two years are the most that clover ought ever to be continued in the ground. Timothy would continue good several years longer. But this is of no consideration in a rotation course, which does not well admit of any grass or clover being continued two years on the ground: and it is of great advantage to *turn up the ground, shift its surface, and bury the sods of grass*. The expense of seed for renewing grass is thought too much of by farmers. It is a trifle, when opposed by the advantages gained.

The following rotations further illustrate the aforementioned principles; and shew other varieties of crops.

Clover,

<i>Clover, with Rye.</i>	<i>Timothy, with Rye.</i>	<i>Clover and Timothy, without shelter.</i>
1st Round of Crops. 1st Round of Crops.	RTTT TRTT TTRT TTTR RTTT TRTT TTRT TTTR	CTCT CTCT TCTC TCTC CTCT CTCT TCTC TCTC
2d. 2d.	{ RCC CRC CCR	{ CTCT CTCT TCTC TCTC

The want of a sheltering crop to the young clover and timothy, in most years might prove very material.

In the instances where *timothy* is proposed, *orchard grass* may be substituted.* In some particulars they have a similarity of character: in others they materially differ. Both are blade or spire grasses, tufty and fibrous rooted. Their principal difference is in the forwardness of their spring growth, the time of their arrival to maturity, and their continuance towards winter. *Orchard grass* comes early, is matured soon, and continues green late in the season; just

* It is said there is a grass called *orchard grass* in England; which from the description given me, is very different from the *orchard grass* of America—so called from its growing better under trees than other grass.

just as clover does. *Timothy* is late in its coming in the spring, and late in ripening.

It is not uncommon in the ordinary husbandry, to sow lots of ground with clover and timothy seeds, mixed. But a better companion for clover is orchard grass. Yet in a rotation system, clover ought not to admit any kind of grass seeds to be mixed with it.

When *clover* is grown, it must be cut: it ought to be sooner than is usual. *Timothy* growing with clover, is cut with it, in a young and very imperfect state. In this case the clover gives matured hay: the timothy a crude food containing little of nourishment. Horses prefer ripe, full-grown timothy in hay. Mr. Gettings, of Gunpowder Forest, Maryland, pressed with work, could mow but a part of his timothy before harvest. He ordered the pretty green hay from this mowing should be reserved for his favourite horses. His hostler informed him, they preferred the brown hay cut after harvest; and he saw and was satisfied of the fact. Afterwards, Col. Lloyd, of Kent, cut a part of his timothy before harvest, and the rest in July after harvest. He attended to the feeding his horses with these, in consequence of what he had heard of Mr. Gettings' experiment, and assured me his horses

horses preferred the brownish matured hay to what was cut before harvest.*

* “ In some meadows I saw timothy grass standing very thick and high ; and close to it, it was much thinner. On inquiry, I found the part where it was *thin* had been mowed *twice* ; and what stood thick had been mowed *once* only, and that *after wheat harvest*. Mowing timothy only *once* in a season, and that *after harvest*, gains almost as much as if twice mowed (once before harvest and once again in autumn) : besides, horses and cattle will eat *ripe timothy* when they will not look at the other.” Journ. from Hope, in New-Jersey : Columb. Mag. Sept. 1788, p. 502. It is a prevailing opinion, that it is the most beneficial to mow timothy but *once* in a season. The hay of the second cutting is not considerable ; and it is said, especially in the German districts, that a second mowing injures the soil greatly. They think that the fine *aftermath* is superior in value to the hay of a second cutting : moreover a due ripeness of the timothy is more certainly obtained when only once mowing is practised ; and the aftermath of a second growth, when eaten down, leaves the meadow naked and unsheltered late in the season, to damage from frosts and cutting winds of the winter. I have wished to be well experienced in *rye-grass* ; as it has a pretty blade, is hardy, coming early in the spring and standing late in the autumn. European farmers are fond of it ; and we ought to give it a fair trial.

TABLE OF THE COURSE OF CULTIVATION AND OF CROPS:

OF CROPS AND BUSINESS.

15

A	B	C	D	E	F
Year.	Fallow, 8 acres. Plow in Bw. * Dung. Sow Rye. †	Fallow, 8 acres. Plow in Bw. repeatedly. Sow Rye.			
1					{ None in this year.
2	Sow Clover. Mow Rye. Gypsum.	Mow Rye. Plow in Bw. Sow Rye.	Mow Rye. Plow in Bw. Dung. Sow Rye.	Mow Rye. Plow in Bw. repeatedly. Sow Rye.	{ RRRRRR. Mow Rye. Plow in Bw. repeatedly. Sow Rye.
3	Mow Clover. Mow Rye. Gypsum.	Sow Clover. Mow Rye. Gypsum.	Mow Rye. Plow in Bw. Sow Rye.	Mow Rye. Plow in Bw. Dung. Sow Rye.	{ CRRRRR. Mow Rye. Plow in Bw. Dung. Sow Rye.
4	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clover. Sow Rye. Gypsum.	Mow Rye. Plow in Bw. Sow Rye.	Mow Rye. Plow in Bw. Sow Rye.	{ CCRRRR. Mow Rye. Plow in Bw. Sow Rye.
5	Mow Rye.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clover. Sow Rye.	Sow Clover. Mow Rye. Gypsum.	{ RCCRRR. Mow Rye. Plow in Bw. Sow Rye.
6	Mow Tim.	Mow Rye.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clover.	{ TRCRRR. Mow Rye. Plow in Bw. Sow Rye.

* Buckwheat.

† Not Ray or Rye *Graſs*; but Rye *Corn*; to be cut and cured into *hay*, when the heads are shooting out of the sheath.

TABLE CONTINUED; IN RECURRING ROTATIONS.

A	B	C	D	E	F	Crops.
7	Mow Tim. Plow in Dung. Sow Rye.	Mow Tim.	Mow Rye.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Sow Clover. Mow Rye. Gypsum.
8	Sow Clover. Mow Rye. Gypsum.	Mow Tim. Plow in Dung. Sow Rye.	Mow Tim.	Mow Rye.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	RTTRCC.
9	Mow Clover.	Sow Clover. Mow Rye. Gypsum.	Mow Tim. Plow in Dung. Sow Rye.	Mow Tim.	Mow Rye.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.
10	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clever.	Sow Clover. Mow Rye. Gypsum.	Mow Tim. Plow in Dung. Sow Rye.	Mow Tim.	CCRTTR.
11	Mow Rye.	Sow Tim.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Tim. Plow in Dung. Sow Rye.	RCCRTT.
12	Mow Tim.	Mow Rye.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Clover. Plow in Lime. Sow Rye. Sow Tim.	Mow Tim. Plow in Dung. Sow Rye.	TRCGRT.

GRAIN

GRAIN ROTATIONS.

If reducing the cultivation of *grass* to regular systematic rotations be advantageous, how much more so must it be to apply such rotations to the more complicated and various business of *grain farms*!

Of the English Old Courses of Crops.

Until about the middle of the 18th century, one of the best common courses of farming, in England, consisted of a *fallow*, which broke up and cleaned the ground, by several plowings, but left the soil exposed to the scorching sun, during the hottest season, without any shading crop, and on this *wheat* was sown; *peas* or beans following the wheat: then *barley* (or oats or both) in succession, on one moiety of the farm, during ten to twenty or more years: the other moiety during that time being in common pasture grasses.* When a change was to be made, the moiety in grass was plowed and prepared; and then thrown into the course of crops as above; and that which had been in crops, was sown with mixed

B

grass

* “In good land the worse rotation of *fallow*—*wheat*—*beans* (or *peas* or *barley*) more usually prevailed.” This and the following notes distinguished by an S. were written with a pencil, in the margin of one of my essays, by an English country gentleman.

grass seeds (not clover) to lay as before ten or twenty years. The whole arable or plowable part of the farm thus divided into moieties, or nearly so, was exclusive of the homestead and standing meadow. So that a farm of 300 acres, admitted of 150 acres in grass, lay, or old field, and 150 in crops. Their fields bearing crops were seldom equal in quantity : but in the following design they are so considered.

No. I.

Acres.	
37 fallow, <i>naked</i> , yields nothing	—exhausting*
37 wheat, bushels	555 —exhausting
37 peas or beans	555 —ameliorating
37 barley	740 —exhausting
<hr/>	<hr/>
150 in crops, 4 fields	1850 bushels.†
150 in grass or lay.	
<hr/>	
300 acres.	

The

* The richness of a clean soil is in a state of waste, when exposed to the exhaling hot sun. But the English fallows are manured. The plowings open and clean the soil for receiving seed and producing the crop desired ; though in less perfection than when the fallow is protected by shade during its being plowed or harrowed. *Exhausting* here means no more than that the fallow, when exposed naked to the sun, is robbed by exhalation of a part of the nutrition of plants deposited thereon.

† See the next page for the quantities of the crops.

The manure added, ameliorates : yet the sun shining on the naked foil, in the hot season, is thought to exhale much of the valuable contents of the manure, and of the ground.

B 2

The

ed in the soil, more than if it were sheltered by plants growing in rows on the fallow : yet naked fallow is so far advantageous that it breaks and cleans the soil, without which seed strewed on the ground would yield no crop. But the ground broken and cleaned whilst under shade, is considerably defended from the exhaling sun and wind ; and is also meliorated by *perspiration*, from juicy plants growing in the rows. If what voyagers say be true, that some dews, particularly in the Persian Gulf, are salt, the farmer may readily apprehend that a part of the riches of his soil may also be exhaled by the sun ; and he will resort to *shading* crops on his fallow, for defending it against waste. He knows the value of mere moisture, and how soon it evaporates when the earth is exposed to the sun and wind without shelter. Besides what I have read of this in Harris's Collection of Voyages, a celebrated late traveller into Egypt and Syria, assures me it is true ; and that he has tasted the salt from dew on his lips, in those countries. Though *southern* countries are the better for shading fallow crops, yet *northern* countries may be better without the shade. In the high latitudes of *England*, shaded fallows are contended for : how is it in *Scotland* or in *Sweden* ?

† The quantities given, of the crops, are not meant as real or even as estimated quantities ; but are noted at random, and continued at the same rates in subsequent courses, for comparing the grain products of entire farms, as they are differently divided. All contain 300 acres.—The Maryland and Pennsylvania bushel, like the London measure *in use*, is somewhat larger than the English Statute bushel—about $\frac{1}{4}$ th.

The above is of the crops of *one field during four years*; or of the *four fields in one year*. The following is a plan of the whole farm (homestead, meadow, and lay excepted) with the courses of the crops in those *four fields* during *four years*.*

Years.	A	B	C	D	Fields.
1791	Fal.	Wh.	Pc.	Ba.	.
1792	W	P	B	F	.

1793	P	B	F	W	.

1794	B	F	W	P	.

The medium produce of these fields, in England, is more than is above stated. But it is well to suppose the quantity they produce per acre is as in this and the following statements: nor is it material what the quantity is, when how much the English soil or how much the American gives, is not under consideration.

English

* *Four years crops*, of four several articles, interchanged on *four fields*, complete a rotation of four years; which if properly designed, will recur as often as you please; and on the plan will read, diagonally, the same through every Rotation.

English New Courses or Rotations of Crops.

The better courses of crops are founded on these principles: To *fallow*,* and to have growing on the fallow, whilst it is yet under the plow or hoe, a *shading* and ameliorating or mild crop: never to sow any sort of *corn* immediately after corn of any kind: to sow *clover* or an equivalent on every field of small grain: and with a course of well chosen crops and the *shaded fallows*, prevent the soil from *resting*, *hardening* and running into weeds.

Thus entire farms are continued in a constant rotation under 4 to 6 or 8 divisions or fields; so as with the clean, mellow state of the whole arable, to give a pleasing system of business, improve the soil and procure a considerably larger income.

Plowing the fields *every year*, bids fair to annihilate even *John's-wort* and *garlick*—indeed every growth but of the crops *designed*. The rotation system warring against *weeds* and all coalescence or
settling

* The intention in fallowing is to plow up and pulverize the ground; shift its surfaces; destroy weeds and bring up or cover seeds to be sprouted and destroyed. “*Hills* should be plowed *obliquely* to the right hand, from the top, down; by which the furrow *turns readily*: as it also does when the plow returns *obliquely* up hill, parallel to the former furrow made in going down hill.”

settling and binding of the ground, will not allow the land to *rest*. It urges you on to perpetual culture; but *rest*, being a friend to *weeds* and a *hardness* of the ground, cannot belong to *culture*. There is a strong expression among husbandmen, of “*land utilising itself*.” They apply it to ground which has been cultivated, and afterwards neglected; so that it *rests*, *settles*, and returns to its wonted hardness.

No. II.

60 acres barley	bushels 1200	— exhausting
60 clover	· ·	— ameliorating
60 wheat	· 900	— exhausting
60 clover*	· ·	— ameliorating
60 peas or beans	900	— ameliorating
<hr/>		<hr/>
300 acres in 5 fields.	3000 bushels.	In

* “ I believe it is never practised to sow clover twice in *five years*. The ground would soon be exhausted of the pabulum of clover, and the feed would not vegetate. The rotation of clover, sown once in *four years*, cannot be long continued without occasionally *changing* the clover for some other grass, usually hop-clover or trefoil mixed with ryegrass. Without such change the ground becomes sick of clover, and the clover will no longer thrive.—The best rotation on strong land that will not bear treading with sheep, is *barley—clover—wheat—beans*: or *barley, beans, wheat, clover* two years. In light land, the best and almost universal rotation is *barley—clover—wheat—turnips*.” S. The above is said of clover in *England*. And it also is there

In their sandy light lands, *turnips* in a well prepared soil are a common fallow crop, instead of peas
or

said of their clover, that it fails much more than formerly ; for that it comes up very thick and fine, but “*dies away* in “winter.” 2 E. Tour 128. And again, the same book, p. 165.—“ Land is tired of clover. It comes up thick and fine, “but is all eaten off in February, by a red worm ; which did “not use to happen.”—Home’s Pr. Agr. 161, speaking of *change of species*, says,—“some plants are designed to fix the “soil ; others, to *open* it ; the *fibrous* rooted and the tap root—“ed.” So far at least *change of species* is advisable, and sowing *corns*, which have *fibrous* roots, and *legumines* or *clover*, which have *tap-roots*, alternately, tend to effect this ameliorating purpose, and preserve a due medium between too close and too open a soil. Though *change of species* may be necessary, I do not believe that *change of seed* of the same kind, at least of wheat or other common *corns* is. I never could perceive any difference. Many ideal old sayings pass current without examination. What more current than that acid of vitriol is a poison to soil, or to vegetation ? yet Doctor *Home* proved it to be a powerful manure ; and plaster of Paris is but a calcareous earth saturated with acid of vitriol. So it is said of animals, that it is necessary to *cross the strain*. To be sure a horse of superior breed, may be expected to give a better colt than your present inferior breed. Mr. *Bakerwell* says, propagate from your own horses till you meet with better. Certain seeds of *exotic-plants*, may be changed to advantage, yet the *corns*, common to all the world, it seems, require not a change of seed. It is said that, “in *Egypt*, the French are obliged to “import, annually, the seeds of cauliflowers, beets, carrots, “and falsify ; and apricots, pears, and peaches, transported “to *Rosetta*, degenerate.” Vol. Syr.—And so it is in Ame-

or beans; the turnips being thinned greatly, and frequently hand-hoed, or if in rows, horsehoed, so as to keep the ground clean and well stirred; and they are always on manured ground.*

A

rica, respecting *cauliflower* seeds. Yet Kliyogg, the noted Swiss Farmer, is warm for changing his feed-corn frequently.

* Our American farms are 10 to 15 degrees south of the farms in England; yet so keen are our frosts and so sudden and frequent the changes from thaw to frost, that common turnips do not stand the winter through in our fields. The Swedish plant, called *ruta-laga*, or *ruta-baga*, is likely to stand our winters; for supplying cattle and sheep with a juicy food in winter and spring,—a sauce to their dry food, for keeping them open against the costive effects of straw. Doctor Collin, Swedish Missioner in Philadelphia, says it is considered in Sweden as a species of *Cole* or Colwort, and is called *Rot-kål*, having smooth leaves. I have but once had an opportunity of sowing its seeds: the roots from which stood through the winter perfectly sound, in the ground. But it was the mild winter 1795-6.—The common course of crops in England, of *turnips*, *barley*, *clover*, *wheat*, a change on only four fields, of their light lands, after twenty years experience, is thought by some farmers to surfeit the ground, by the frequency of the repetition or recurrence of the same crops, ~~when they are without manurings~~: the same crops returning in the short space of every four years. Here instead of allowing the soil to be impoverished in consequence of its being 20 years under crops ~~without being dunged~~, the mind flies to fancied surfeits of the ground. Call it what you will, in half twenty years most soil will shew some degree of impoverishment, from the crops taken off without manure given to the soil. Mr.

5 Years.	A	B	C	D	E	Fields,
1791	Ba	Cl	Wh	Cl	Pe	
1792	C	W	C	P	B	
1793	W	C	P	B	C	
1794	C	P	B	C	W	
1795	P	B	C	W	C	

1791

Pitt, an excellent farmer in England, who mentions this to Mr. Young, thinks it is very bad tillage, especially *on weak soils*, unless the land is marled or twice ~~at~~ manured in the rotation. He adds, that on breaking up the turf, some have with success, taken *spring corn*, followed immediately, after working the land well, in *wheat, turnips, barley* with grass seeds, and *manuring upon the seeds and for the turnips*; which course, he adds, proves good, and the crops heavy. The superiority of crops in this course, he thinks, is caused by *manuring on the seeds, and by a fifth of the land laying five years in grass.* 4 An. 478. This suggests the propriety of having, *in every rotation of crops, one field extraordinary to lay in grass*, not clover, till the course ends: that is, whilst the four to five or six fields are revolving in crops, one other field is to be laid down and continued in grass, or rather standing meadow. For instance: *wheat, clover, rye, clover, peas or beans or roots*, interchange whilst the grass-field continues unbroken,

1791 Ba Here the crops are the same as the preceding—but the *course* is different.
 1792 Cl In that the clover is annual: . . . in this it continues two years. When
 1793 Cl · clover is continued two or more years,
 · · · it lets in weeds and some binding of
 1794 Wh the ground, to a degree that may have
 · · · occasioned the saying, in England, of
 1795 Pe the ground becoming, in that country,
 · · · “clover sick.” But *yearly* renewing
 the clover in a rotation of crops, neither admits of
weeds or a *binding* of the ground. The clover in
 this case, being sufficiently thick and well sown, ef-
 fectually shades and mellows the soil, without having
 time allowed it or the soil to decline.*

Comparison

during the five years crops of grain and clover. Then this is broke up, and put into a course of crops, as the others; and one of the crop-fields is laid down in grass. Accordingly under the article *recurring crops*, is a design of rotation crops attended with a permanent *meadow*; and another design of a field in *meadow*, and another in *Hemp*, during the time of other crops in rotation.

* The climate and the soil of America may be believed to differ greatly from those of England, respecting the growth and perfection of some particular plants. Wheat sown there 2 to 3 bushels an acre, yields great crops of corn. Two bushels an acre sown in Maryland or Pennsylvania, would yield straw without grain. In Maryland three pecks are commonly sown. I never had better crops than from half a bushel of feed wheat

Comparison between the English Old and New Courses of Crops.

Upon comparing the old with the new courses in England, it occurs that the 120 acres in clover, may be considerably superior to the 150 acres of common grasses on the hide-bound soil of the lay or old field; and that the grain and straw is superior as 300 to 185.

Peas

to an acre, in a few instances. In these instances, the ground was perfectly clean and fine, after many plowings or horse-hoings of maize; on which the wheat was sown in September, whilst the maize was ripening. It was a clay-loam, highly pulverised. But because of the loss of plants at other times, I preferred to sow three pecks an acre.—The attentive Mr. E. an excellent farmer of Pennsylvania, made a farming tour in England; and observed that clover there is inferior to what it is in Pennsylvania. This may be owing, partly, to the climate and soil being less friendly to this plant than in America: and certainly it is against clover to continue it growing for years, so that weeds and fibrous rooted grasses are let in to rob the clover and bind the soil. It is even an English practice to sow rye grass with clover: and rye grass is a very fibrous rooted binding plant. The ground becoming “clover-sick” is unknown in America,—unless its being reduced by a long continuance of the clover and introduction of weeds and grasses, will admit of the expression. But clover-sick in the sense spoken of in the note page 22, is unknown and unsuspected in America. Red clover is only meant. Ground being *clover-sick* or surfeited with clover, is attributed by a Surrey cultivator to shallow plowing. His land was sick of clover, having been sown every fourth year, but on his

Peas and beans are inoffensive,* as is clover, and even are ameliorating. They all *shade* the ground during the hottest time of the year. All corns impoverish ; and withal, the *small* kinds let in *weeds* ; which with *rest*, bind and foul the soil. But they check the washing away of soil ; which maize culture greatly promotes, by repeated plowings or scratchings given whilst the maize is growing.

No. I. has two fields stirred and cleaned : the fallow, a naked one, and the pea or bean field when in rows. The growing crop of the last shelters the soil from extreme exhalation ; and is the only ameliorating crop against the two exhausting crops, wheat and barley. No. II. has one horsehoed or plowed field, in a fallow crop of peas or beans ; and three fields of ameliorating productions, which are peas, clover, clover (that is continued two years) against the two exhausters, wheat and barley. The field-bean in England, though small, is of the nature of the garden or Windsor-bean. It grows upright, and giving but a partial shade, is not fully
an

plowing 12 inches *deep*, manuring greatly, and then sowing clover every third year, Mr. Young marked the result for 9 years, and never saw finer crops.—2 An. 366.

* “ Not unless they are kept clean from weeds by hoing, which cannot be performed, unless they are sown in drills.” S.

an ameliorating crop, unless well horsehoed in the intervals, between the rows.* Neither are turnips or potatoes good fallow crops unless they are manured and cultivated in the like manner. They there are always on manured ground. English *peas* soon covering the ground, even when sowed broad-cast, are good fallow crops, although not horsehoed. Having but little root, most of their nourishment, it seems, is derived from the atmosphere. The plants are juicy and emit much perspiration on the ground.

American Old Courses of Crops.

When in Maryland a farm is divided into three fields, the common course is maize, wheat or rye, and spontaneous rubbish pasture. When in four fields, it is maize, naked fallow, wheat, and the like mean pasture: or maize, wheat, lay or poor pasture during two years. And whilst in some parts of America, the fields are four or five, in other parts the divisions

* " Beans are usually drilled in rows 18 or 20 inches asunder, in England, and kept clean by handhoing, in Yorkshire, the distance not admitting of a horseshoe; nor did I ever hear of one being used, except perhaps in some part of Kent, where beans grow with an unusual luxuriance, and are consequently sown at an unusual distance." S.—In Maryland I shimmmed (a kind of horsehoing) peas, beans and potatoes, growing in rows 18 or 20 inches apart, equal to two of my plow furrows.

divisions are as low as two. Two exhausting corn crops repeatedly taken from three or four fields, after some years of such crops, would scarcely admit of eight bushels of wheat an acre being produced on common land, one year with another :* but suppose

No. III.

100 acr. maize, at 12 bushels	1200
100 wheat, 8	800
100 lay, or mean pasture	
<hr/> 300 acres in 3 fields	2000 bushels.

No. IV.

75 acr. maize	
75 wheat	
75 lay	
75 lay	
<hr/> 300 acres, in 4 fields.	

No.

* A few years since, it was a general belief that six bushels of wheat an acre, was the medium produce of a large extent of country within the peninsula of Chesapeake: but since then, till the Hessian fly took possession of the wheat growing there, the wheat culture was improved so as to gain a larger produce, in that district. I cannot so well judge of the crops in Pennsylvania; but believe they exceed twelve bushels of wheat on an acre, when clear of injury from the Hessian fly; and that they are progressing with the increasing state of clover and manurings with dung, gypsum and lime. Here the corn-ground is *manured*, for maize, wheat or barley. In

No. III. and IV. give light crops, mostly of a cheap corn, very poor pasture, and but little hay (if any) for keeping a stock of hide-bound beasts and preservation of a soil which is in an obvious consumption. Under such severe treatment, land is continually losing strength; and it may be, greater productions are here allowed than the old settled maize farms yield, and than new ones can long continue to yield, under the old habits of farming, if it may be called farming.*

We almost universally cultivate one field in maize, whatever may be in the other fields. The maize being frequently plowed or horsehoed,† the ground is

Maryland, alas! the manuring entire *fields*, is scarcely known in any instance.

* What is above said, applies to Maryland rather than to farming in Pennsylvania, where watered or irrigated meadows have long been in common use: and it is remarkable that the irrigated and bottom meadow lands are now thought lightly of, in comparison with the very high estimation they were in before clover came into field culture. Still irrigated grounds are, as they ever will be, very valuable: but so sure and plentiful are clover crops, that the Pennsylvania farmers are less solicitous about meadows. Till lately a farm without irrigated or bottom meadow, was never much valued. Now, purchasers are less anxious for those articles, as they are sure of abounding in clover and hay from the arable upland.

† Horsehoing, is stirring and cleaning from weeds the interval ground, with a plow or any instrument which cuts,

is thereby kept *light* and *clean*; and it gives a fallow with a crop: but it is an ill chosen crop for a fallow, because of its giving only a trifle of *shade* to the fresh exposed soil, and because it is *corn*, to be succeeded commonly by other *corn*: and all corns are terrible exhausters. Some farmers sow wheat on this maize-field, in September before the maize is ripe, on a clean, light soil. Others delay sowing it till the ensuing autumn, when the soil being somewhat settled and much in strong weeds, they plow, harrow, and sow it with wheat. Of the two methods farmers differ in the choice. I have known some who had practised in both methods, return to the former; because the latter was, as they judged, more injurious to the foil than the former method. But it is against *wheat* to sow it on hard weeds or stubble, which keep the ground hollow; and though this may be favourable to *rye*, it is otherwise of *wheat*.

American Fallow-Crops; and New Rotations, with and without Maize.†

Maize taken into a rotation under the new system, according to the newly adopted principles of husbandry,

divides and breaks it by the power of horses, at the same time that a crop is growing in rows between the parts horsehoed. Whilst our maize is growing, we repeatedly horsehoe it; and we call it, “ plowing the corn.”

† These methods are rather proposed than as yet practised in America. But, a beginning is made. Mr. M'Donough

bandry, occasions some difficulty, which seems best overcome by increasing the number of fields. Our husbandmen are so used to maize crops, that scarcely any appear disposed to give up the culture of this corn, for productions much milder in their effect on land. Nor is it advisable that they should relinquish it, unless it may be on thin soil very liable to be washed away, and the land apt to be broken into gutters. Maize is the best of all the corns. It is food for most animals, and its plant yields a great increase of grain. Seasons or plagues which injure other corns do not affect maize: the growing it therefore gives many chances against want. As a food to man it is remarkably wholesome and nourishing, and admits of the greatest variety in its preparations. In cultivating it the soil is cleaned and lightened, preparative to other crops: though it is inferior to preparations with ameliorating crops giving more shade, and moisture from perspiration.

C

No.

of Delaware has practised some kind of rotations on the new principles, with the most pleasing success: and Mr. Pearce, of Maryland, in laying out his fine estate in Sassafras Neck, reserved 120 acres, which he cultivates in six fields, and gives his neighbours an inviting example of the superiority of the new, over the old modes.

No. V.

A MAIZE COURSE.

50 acr. maize	750
50 wheat or spring barley	750
50 clover	
50 rye or winter barley	900
50 clover	
50 clover, pulse, or roots	
300 acres in 6 fields	2400 bushels.

It is a fault in this system that wheat succeeds maize, that is corn succeeds corn. Rye or barley might have been in the place of wheat, but these also are corns, which exhaust the soil. Clover after maize which has not been manured is not likely to succeed, especially when sown without a *sheltering* crop; and this sheltering crop being from any grain, would introduce the mischief incident to corn on corn. But even this faulty system is far preferable to any of our old courses.* Had there been only five

* On the above maize course No. V. Mr. S. Observes that —“ unless there is something in the soil and climate of America, far more favourable to clover than in those of England, this rotation could not be repeated, for reasons before given. It probably is not sufficiently ascertained how frequently clover can be sown in America.” S.—Buck-

five fields, it would have been worse for the soil; because a course of only two fields in ameliorating crops to three in exhausting corn, must in time render the ground weak, and comparatively unproductive. Yet corn may follow corn, where manure has been duly applied, occasionally but not generally, nor of choice.

BETTER MAIZE COURSES.

No. VI.

50 acr. maize	750
50 pulse (or roots)	500
50 barley	1000
50 clover	
50 wheat	750
50 clover	
300 acres, in 6 fields	3000 bushels.

C 2

No. VII.

wheat is an excellent sheltering crop to clover, sown in July. If maize has been manured, a crop of buckwheat, from a sowing in July, may be taken off in October, after it has sheltered clover sown also in July on the buckwheat being sown. See the note page 7. 50. American beans are meant in American crops.

No. VII.

43 acr. maize	645
43 pulse or roots	430
43 barley	860
43 clover	
43 wheat	645
43 clover -	
43 clover (a second year)	
300 acres in 7 fields	2580 bushels.

Here the corn crops are interposed by clover and pulse: both of them ameliorating to soil; especially when the pulse grows in rows so near as to shade the well plowed and cleaned intervals; and these crops are of three or four ameliorators, to three exhausters.*

BEAN-COURSES.

Farmers having washy soils, who would exclude maize from their crops, may adopt No. II. in five fields; or one of the following in 6 or 7 fields; observing that the beans must be the American sorts.

No. VIII.

* Wheat, barley, rye, maize, oats, and generally all sorts of grain of which *bread* is made, are *corns*.

No. VIII.

50 acr. beans and roots	.	500
50 barley	.	1000
50 clover	.	.
50 wheat	.	750
50 clover	.	.
50 rye	.	750
300 acres, in 6 fields	.	3000 bushels.

No. IX.*

43 acr. beans and roots	.	430
43 barley	.	860
43 clover	.	.
43 wheat	.	645
43 clover	.	.
43 rye	.	645
43 clover	.	.
300 acres, in 7 fields	.	2580 bushels.

Beans or peas, following clover, are drilled on *one* deep plowing in June. Barley is sown in September or October, on *one* plowing; the ground having been left clean and mellow after inning the beans.

* " For reasons before given this must be the worst rotation " yet pointed out; the clover being sown three times in seven " years." S.—This in England. But, in America, clover is free from the disorders imputed to it there.

beans. Wheat is sown in September on one plowing in of the clover. What a saving of work!—Three crops on only one plowing for each, and performed at leisure! on ground in the mellowest condition. The beans are plowed for in June; the wheat in September; the barley in October, or September: or on some crops in March. One of them, a cleaning crop, is horsehoed or shimmmed without any interference with the plowings and other work in sowing the wheat or barley. The clover which is to be plowed in for beans, may be pastured till June, if not mowed for hay: this would be especially advantageous on farms deficient in meadow; as there will then be two clover fields for grass and hay; and moreover the ground of that mown, will be preserved in a light and mellow state, for receiving the bean seed on the one plowing. These beans are *American*. But if instead of beans, the choice be of *peas*, then I should expect the *English pea* would be best; and from what Mr *Parkinson* says of peas of the early Charlton garden sorts, I would make an experiment of that sort, sowing them early in March as they would bear. His proposed preparation with turnips and garden English peas, is very promising.

The following are plans of all the fields in No. VI. a *maize system*, and No. VIII. a *bean system*; shewing the whole of their crops during six years.

No. VI.

<i>6 Years.</i>	A	B	C	D	E	F	<i>6 Fields.</i>
1791	Ma	Be	Ba	Cl	Wh	Cl	
1792	Be	Ba	C	W	C	M	
1793	Ba	C	W	C	M	Be	
1794	C	W	C	M	Be	Ba	
1795	W	C	M	Be	Ba	C	
1796	C	M	Be	Ba	C	W	

No. VIII.

<i>6 Years.</i>	A	B	C	D	E	F	<i>6 Fields.</i>
1791	Be	Ba	Cl	Wh	Cl	Rye	
1792	Ba	C	W	C	R	Be	
1793	C	W	C	R	Be	Ba	
1794	W	C	R	Be	Ba	C	
1795	C	R	Be	Ba	C	W	
1796	R	Be	Ba	C	W	C	

Three

Three valuable crops produced on only one plowing for each, is very important: and they are on ground in the mellowest condition. Other valuable crops may be procured from ground not even once plowed *for them*. Every American farmer has his maize field; which is or ought to be highly plowed or horsehoed, and if not sown with the *exhausters* wheat or rye, it is suffered to run up in weeds: but,

Instead of sowing wheat or rye on the maize ground, or leaving it naked, why not profit of the maize plowings and cultivation, in obtaining milder crops on the same ground which require no other cultivation than what are necessarily applied to the maize, unless it be to strew manure along the rows of roots, below mentioned? Wheat and rye are sown in other fields, on clover.

If the maize is 4 feet apart in the rows; and the interval ground between the rows 7 feet, the clusters or hills of maize are 1550, say 1500 on an acre. Between the clusters of maize, in the rows, may grow cabbages, or potatoes. One cabbage in that space; or two holes of potatoes, a foot apart.*

Along

* An acre of maize would thus be accompanied with 1500 cabbages, and 3000 potatoe plants; both whereof must be dunged. Query—of the difference between placing the seeds of cabbages where the plants are to stand and grow to maturity, and transplanting the young plants as usual?

Along the middle of the *intervals*, turnips 10 or 12 inches apart: or ruta baga the same distance, sown in May, in the four foot step or space, instead of cabbages. Plows or shims are to be worked lengthways of the intervals, in a space of $3\frac{1}{2}$ feet on each side of the rows of *turnips*, whilst the maize and other plants are growing.

Near the end of September or first of October, with sharpened hoes, cut up the maize stalks close to the ground; having first stripped the blades and cut off the tops, but always leaving the ears on: and pile the stalks and corn in pyramidal form, in small parcels, on the turnings or head-lands, to cure. What of the potatoes or other roots cannot be saved in cellars and holes, may be covered with earth by plowing.

The greatest quantity of *grain* produced in a rotation is not alone a proof of its being the best system. A large quantity of good meadow would yield much hay. It is a sin against good husbandry to sell off the hay of a farm. Unless it be with great caution, where the farm is near a large town; from whence or otherwise it is plentifully supplied with manure. Numbers of cattle well fed and well littered, give the manure, in addition to other manures, requisite for invigorating the soil: but numbers of

cattle

cattle cannot be kept in good condition *through the year*, unless clover or grass as well as hay or straw abound. The summer food and that of the winter are to bear a due proportion to each other: and the fields of grain are not to exceed the fields of *ameliorating* crops. These preserve the soil, as well as produce crops: but *grain reduces* the soil in producing the crops. Aim at income from *livestock*, which *improves*, rather than from *grain* which *impoverishes* your land.

It is reasonable to expect that the better courses No. VI. VII. VIII. and IX. would yield by the acre, more of every article of produce than the inferior course No. V. But they are stated alike. Of the several sorts of white beans, I have only cultivated the white dwarf or bush bean, in my fields, which was in rows 18 inches apart, and the intervals were stirred and cleaned with a *shim*, the blade whereof was a little convex in the line of its front or edge, and 12 inches wide. The ground perfectly clear of stone and gravel. These beans considerably shaded the ground, though not so fully as was wished. It was therefore intended to have tried the sort of white beans which would run and *shelter* the ground more perfectly, after being horsehoed with a *shim** repeatedly,

* *Shims* are in various forms, acute or obtuse, as the ground is stony or not. In general, it is a hoe drawn by a horse.

peatedly, as long as that instrument could be admitted to pass between the rows to advantage. Removing

The blade of the one I used, was 12 inches wide, and was welded to a small coulter on each side of it, serving also as standards to the blade. Two slits are fastened to the coulters with screws and nuts, which could be shifted to different holes for setting the shim to go deeper or shallower in the ground : but the shifting them was little used. The shim is not used in half plowed ground : but this being previously well plowed and harrowed, the shim runs 3 or 4 inches deep, and crumbles the earth into such minute parts that, as it proceeds, the earth seems to pour over the blade of the shim like water. A coarse rake of 4 or 5 teeth, hung to the tail of the shim, as it worked. The two coulters or side standards seemed to interfere with the growing vines, when they were advanced to a considerable size : but there appeared no real damage from it. A single standard of wood or iron would be clear of even full grown vines. I did not always hill or ridge up potatoes and beans, nor even maize. For though maize is the better, yet the ground and future crops are the worse for it. But it is well to edge up some moderate quantity of earth to plants cultivated in rows with the horsehoe or shim. The intention whereof is to smother infant weeds which have just broke out close to the crop, and beyond the reach of the shim. Hills and ridges are not otherwise so advantageous as is commonly thought : and there are advantages in keeping the ground nearly level when under maize. A slip of iron is made to shift off and on each side of the blade of the shim, for occasionally edging up light ridges of earth. The shim is an excellent instrument against young weeds ; but is insufficient where grass and weeds have obtained strength. When the ground is in good condition, it performs a vast deal of work, very satisfactorily.

moving to reside in Philadelphia, prevented the making this experiment. It is said that white beans are generally in great demand in Madeira and the southern countries of Europe. I have seen letters from Barcelona stating the price of "white beans" higher there than of wheat. Other sorts of American beans as well as several sorts of American peas, I have cultivated; and the crops of all were rather precarious; peas generally more so than beans, excepting the lady pea, which is round and the size of duck-shot. These I preferred and chiefly cultivated. They make excellent soup; bear well; and are dwarf or bush beans. If sown, in Maryland the 10th to the middle of June, they ripen nearly altogether; otherwise not. They were in rows 18 inches apart, and the clusters 10 inches apart in the rows. The intervals were shrimmed two or three times: and the plants handweeded and hoed once in the rows. Until some other plant shall be introduced which will answer better than beans for a fallow crop*, farmers ought to think nothing of giving a dollar a bushel for them to be applied to produce a shading and ameliorating article of fallow, although not a bean should be gained from them: preserving the system being so very important! It is not uncommon for active

* *English peas*, especially the early garden sorts, are the plants that answer our purpose; as Mr. Parkinson has induced me to believe. See p. 38.

active spirited farmers in England, to sow seeds of various plants, merely for improving their soil : such as vetches, tares, buckwheat.* These whilst growing, *shelter* their fallows ; and being plowed in green, they ferment and open the soil. Such also is the effect from clover ; which having wheat sown on it, upon *one* plowing, is followed with extraordinary crops. In Italy farmers distant from towns want manures. They have no marl ; but they commonly apply lupines thus : the plants in green full pod are taken up by the roots laid in the furrows, and then earth is thrown on them ; and it is said they thus give a very fat manure. Mr. Young mentions an excellent course of shade and green dressing, preparative to a corn crop ; by which seeds for producing three crops were sown on the same ground, between autumn and autumn, with only three plowings, thus : winter

* *Vetches* and *Tares* are different names for the same pulse, the varieties are great. Generally, they are divided into winter and summer vetches. Consult Mr. Anderson's Agriculture. He speaks of sorts which are perpetual. I would prefer a vetch hardy enough to bear out winters ; and that is of quick growth and ripens early, whether it be of the perennial kind or not. With such a plant might be practised Mr. Young's "round and complete" mode, presently mentioned in the text. One sort of winter vetch, I have tried ; the seed imported from England. The seeds were sown in two successive autumns. The ground being rather of the sort called "water holding," only about a moiety of the plants stood through the winters.

ter *tares* were sown in September with one plowing. They were reaped early next summer. Then immediately *buckwheat* was sown on one plowing and harrowing. The buckwheat was plowed in, in September ;* and wheat was sown on this, on one plowing ; the crop whereof was great. "Thus, " says Mr. Young, as the spring advances, and the " sun becomes powerful enough to exhale the hu-
" midity

* *Buckwheat* is to be plowed in before it seeds, lest a new growth becomes a weed to the crop of corn. The Aquamaque or Magothy bay-bean, *cassia chamaecrista Lin.* has wonders imputed to it as an ameliorater of the light *sandy lands* in the peninsula of Virginia. In size and other particulars, the plant may be considered as being a Lilliputian locust tree. For, although it is an annual, yet its stem is a hard locust-like wood ; and its leaves, flowers, pods and seeds greatly resemble those of that tree. The woody hardness of the plant is in appearance against its being a choice ameliorater, as it is not likely to ferment and as it were melt away in the ground, so soon as buckwheat and other juicy soft substances. No plant, however, can exceed the *shade* it gave on a piece of ground in my garden. A Lilliputian might have been there lost in darkness. This *shade* and a *perspiration* from the plants, during the greatest heat of summer, together with an extraordinary quantity of *blossoms*, *pods* and *leaves*, which the plants deposit on the ground are probably what give the great manuring and amelioration, which the people of Aquamaque satisfactorily experience. But this plant, which is not the Partridge pea, is so difficult to eradicate, it is said, that it might become an injurious weed in *other soils* and *courses of crops* than those in Aquamaque. Their courses being maize, oats and hay, on a sandy loose soil.

" midity and with it the nutritious particles of the
" land, the crop (which was from a full sowing)
" advances and screens it from the action of his
" beams. Whatever weeds are in the soil vegetate
" with the young tares, and are either strangled by
" their luxuriance, or cut off with them before they
" can feed. This crop is cleared from the land so
" early that the soil would remain exposed to the sun
" through the most burning part of the summer for
" three months; and if so left exposed, the three
" plowings would do mischief, except in killing some
" weeds. To give one plowing *immediately* and har-
" row in buckwheat, spares expense, and the grow-
" ing herbage shades the earth when it wants most
" to be so protected: withal a dressing of manure is
" gained at no expense. It is not in the power of
" science, of theory or of practice to introduce a sys-
" tem more *round and complete*. Many have sown
" tares; and many have plowed in buckwheat; and
" most have given a year to each; but it is the *com-
bination* of the two that forms the merit."

We may count upon all the arable land of farms yielding a yearly income, *without any part lying idle* in rubbish old field; not as what is the case at present, but as believing that perpetual *alternate* crops from the whole plowable land will insensibly become very general, as the spirit for improvement shall, though slowly, advance on the grounds of reason and experiment.

experiment. With these may be established *sound and familiar systems of the best agricultural employment*: in which *ameliorating*, or mild crops, will be at least as frequent as *exhausting* crops.

Improvements in agriculture will probably be first introduced amongst us by soldiers, sailors, physicians, clergymen, or others who become husbandmen with minds unfettered by the confined views and habits in which common farmers are trained according to those which had been fixed on and handed down through many generations. Attentive husbandmen will at first only look on, ashamed to imitate; which would imply deficiency in their own practices: yet, after a while, they will cautiously begin to adopt certain of the approved new practices. Varying these in some unimportant particulars, they will cherish them as discoveries altogether their own. It is a sort of apology they make to themselves, for their imitating improvements pointed out by men they deem ignorant of what themselves practise and deem to be farming.

A Parti-

*A Particular Design for a Grain Farm.**

Timothy grass, when cut not before milk is in the seeds, makes a brownish and seemingly harsh hay: but horses, the best of judges, prefer it to early cut green hay. On some accounts *orchard grass* may be preferred for permanent *meadows*. It comes early in the spring, lasts till winter, is hardy and gives large crops. The seeds of it shatter out before the heads are generally changed from the green colour. Watch the moment for saving seeds of it.

Keep 20 acres of permanent *meadow* in *timothy* or *orchard grass*, for hay. This last comes early in the spring, with clover. They may be cut immediately one after the other, or at the same time; and the hay stowed away together, layer on layer which may be a means of correcting some supposed bad qualities in clover: at least those dry hays would absorb any redundant moisture remaining in the clover hay. Besides you can stack your clover hay out of doors more securely, when you have a good quantity of timothy or orchard grass meadow for furnishing the clover stacks with good topings from its hay;

D if

* Written for the late Mr. Rigal; when he thought of fitting down on a grain farm, at a considerable distance from town.

if you are not in the practice of thatching with straw.

General Division.	Homestead	10 acres
	Meadow	20
	Crops	120
		—
		150
Acres.	Acres.	
20 Pulse and roots, fal- low crop.	17 Maize, 17 Pulse and roots,*	
20 Barley.	17 Barley or rye.	
20 Clover.	17 Clover.	The wheat being inned, this may be sown in July with Bw. & Clover, if the soil is rich e- nough.
20 Wheat.	17 Wheat.	
20 Clover.	17 Clover.	
20 Rye	17 Roots, or cl. 2 ^d year.	
—	—	
120 acres in 6 fields.	120 acres in 7 fields.	

The

* Instead of pulse or roots, here, there may be a manuring given by a spring sowing of buckwheat turned in, and then buckwheat sown in July for a crop, with clover feed on it: which would give a system in maize; buckwheat, preceded by a manuring with plants turned in green, and sown with clover on the buckwheat; clover; wheat: clover; barley or rye and roots; clover or pulse, in 7 fields: a great variety and change of species the whole easily manured in every 7 years! and according to page 56, there may be a portion allowed to lay, in meadow, during the rotation of crops; and another portion 7 years in hemp. If the maize ground has been well manured, on the last plowing in July, buckwheat may be sowed

The maize course requires one of the fields to be continued in clover, two years; unless it be tended in roots, buckwheat, &c. upon turning in the first year's clover, after the spring mowing. Potatoes are best when planted in June; by which their *bulbing* state *avoids the too dry season of midsummer*. I doubt however of the buckwheat *crop*; as it is said to be impoverishing when it seeds. Roots are generally excellent on several accounts: they are but little injurious to the soil; and when duly cultivated are even ameliorating. They are peculiarly desirable as a winter and spring food to live stock, for their nourishing quality, and to correct the costive tendency of their dry food, and moreover the culture of them affords the best preparation of the ground for future crops. If you cannot think so highly of roots as I do, you may prefer six twenty acre fields, in maize, pulse, barley or rye, clover, wheat, clover one year.* In some of the states there is a ruinous

D 2

bias

for *crop*, and immediately on it, clover seed as above mentioned; the ground being kept level *without any hill or ridge* to the maize plants. Or if a field is meant to be turned out, to lay in meadow during a rotation of crops, then instead of clover, sow timothy or orchard grass with the July sowing of buckwheat.

* The produce of roots and cabbages by the acre on Mr. Muir's farm, in England is as follows:

bias for *large fields of grain*, especially wheat and maize; and this more especially in young giddy farmers, wild after amusements, and wasteful of time and income which ought to be applied to *domestic comforts*. A great deal of ground is scratched and hurried over, with the delusive expectation of much wheat and maize, for extricating them from debt, or to support their habits of frivolous enjoyments *abroad*, instead of improving their farms and promoting happiness *at home*. But, how miserable are the crops!—how impoverished the soil!—and how entangled the improvident farmer!*

A

	Tons.	Ibs.
Scarcity root	19 $\frac{1}{2}$	an acre; 57 a bushel.
Turnips	16 $\frac{1}{4}$	—; 48.
Potatoes	10	—; 60.
Cabbages	14	—; 44.

* Farmers differ in the opinion whether buckwheat is an impoverisher or not of soil. Some say it impoverishes when suffered to run to seed: but all, who have tried it, admit that it improves soil *when plowed in* before it forms seeds. My experience of it is slight. Few farmers south of Pennsylvania, know the value of buckwheat: and being ignorant of its properties, they hold it in no estimation, and avoid it. In England a Mr. Farrers and Mr. Young have given their opinion of it as follows; and in Pennsylvania there are few farmers who do not find their account in it; for all sow it for crop, and some to turn in a portion for a *manure* to the soil. Mr. *Farrers*, a considerable corn factor, desires that all who have horses to feed, will try buckwheat *mixed with bran, chaff, or*

A bean fallow crop is where beans are sown in rows, about 10 inches apart; and the intervals, between

grains, either whole or broken in a mill. When used as grass it flushes cows with milk: it is therefore presumed the meal mixed with grains, would have the same good effect, and enrich the milk. A bushel of it, he adds, goes further than two bushels of oats; even with beans mixed with four times as much bran it will be full food for a horse a week, and much less hay will do. Be assured, he says, 8 bushels of buckwheat meal will go as far as 12 bushels of barley meal. He writes this from experience, and concludes with observing that the advantages produced from buckwheat are as follow:

- 1st. To *plow it in green*, ameliorates the land:
- 2d. In dry summers it is fodder (or as grass) for cattle: and according to the Farmer's Calendar, it will mow twice.
- 3d. If it stands for a *crop*, it may be equal in quantity with oats.

On what Mr. Farrer says, Mr. Young observes that the application of buckwheat as a food to horses, has been very properly touched on by Mr. Farrer; and that it is of very great importance. On my own repeated experience, says Mr. Young, this plant *ameliorates the soil* so much that the farmer may have *any crop* after it, especially *wheat*; and so it is commonly cultivated about Norwich. 1 An. 199. Yet farmers in America say it is an improper food for horses on a journey or any active business: but its meal mixed with other corn, or perhaps with cut straw, answers well even for horses, in a slow draught. But certainly it is a *cheap corn*, which answers *many good purposes*. I never have seen ground tolerably prepared for a buckwheat crop. In common it is sown upon a

tween row and row are 18 or 20 inches apart, and horschoed or shimmmed repeatedly; whereby the ground is kept stirred and clean, so as to be a well prepared fallow for receiving another crop. So it is of a maize fallow crop.

If one field is manured in each year, then the six fields will be all manured in six years, at 20 acres a year: and seven fields in seven years at 17 acres a year. The farmer who *manures* the whole of his arable fields in every seven years, will accomplish a great object, tending highly to his domestic comfort, his reputation, and his independency of creditors! The standing meadow must have its share of *manure*, and milder *ameliorating crops* be attended to.

Manuring one field every year, is to be an unceasing practice, in a regular rotation for ever. *Manures* are to be saved in compact masses, sheltered from the sun; and in some measure from the rain, though what of it falls on the area of the dungheap can

single slovenly plowing of oat or other stubble; and the seed is hurried in, as oats too commonly are, on ground we know not how else to employ. If clover or timothy seeds are to be sown during the hot weather of the summer, buckwheat plants give the most excellent shelter, till in October the buckwheat is cut for its crop: after which the sun can no longer injure the clover; but gives it a due portion of warmth, and pushes it forward till cold of winter locks up all vegetation.

can scarcely injure the dung, some moisture being requisite to its fermenting. It is advisable to make small trials of your soil, with lime, gypsum, clay, trench plowing, &c. on slips of your land: for no one can say beforehand, what will be the effect of these applied to your particular soil.

Every kind of manure is to be carefully collected and duly sheltered. On manure being carried to the field, spread and plow it in quick as possible. Have the implements and the labourers ready on the spot. Range the loads in *lengths*; spread and instantly plow the dung in, line by line. It dissolves better in the ground when turned in fresh; and the whole strength of it is secured to the soil.

For the sake of *manure*, and on account of the *cattle*; keep all live stock *housed*; fully *littered*; duly *fed*, including a share of *juicy* food added to their straw.* A less quantity of litter is requisite

to

* I farmed in a country where habits are against a due attention to *manures*: but having read of the application of *marl*, as a manure, I inquired where there was any in the peninsula of Chesapeak, in vain. My own farm had a greyish clay which to the eye was marl: but because it did not effervesce with acids, it was given up; when it ought to have been tried on the land; especially as it rapidly crumbled and fell to mud, in water, with some appearance of effervescence. Elsewhere I speak of common *yellowish clay*, turned up to two feet at one place, and three or four feet deep at another, proving very

to beasts housed, than when they are in a wet, dirty yard. Salt they should have at all times in artificial licks without stint. Mr. Bakewell for many years gave no litter to his cattle. On the bare earthen floors of their stalls, in houses, they were clean and sleek coated. What of straw must in yards have been disposed of in litter and a mere shew of manure, was advantageously given as food for keeping more cattle. Mr. Cook applied his straw in the same way—housing the stock and cutting up and feeding away every inch of straw.

A System of Recurring Crops; in which one Field is in Meadow whilst the others are interchanging Crops: with a Plan of a Farm Yard, and Buildings, adapted to it. See pa. 25.

To farmers approving of the new methods of cultivation, but who contend that a part of the arable ground

productive of mellon vines. Mr. Young speaks of clays (4 E. Tour 412.) where 8 loads an acre on a sandy loam, answered greatly. At another place, 40 loads of clay an acre, on rich, light, mixed loam, lasted 40 years. All whereof was in a country said to understand and to have experienced marl more than most; and they there prefer the clay to marl, where both are to be had. This is important! and impels me to repeat it, that farmers are to make trials of their soils, in small parcels, with clay, and other substances. Also trials of trench plowing, of various depths.

ground ought to lay out a number of years at perfect *rest* from being broken up or yielding any thing else than grass, the following design is submitted; the rather, as a permanent meadow of spire-leaved grasses certainly is very advantageous; especially if it be only cut for hay and never trod close in pasturing, except it may be, discretely, the aftermath, and also that it be supported by manures. Any sound land may be brought to yield crops of grass: but clover, requiring renewal every second year, is insufficient for a standing or permanent meadow.

The present design allows a seventh of time in grass; and is accompanied as well with the system of recurring rotations of crops, as with estimates and observations which may afford useful intimations.

^{Acres.}

Fds. 30 *Timothy*, in *standing meadow* during the years in which the other fields are under a change of crops:

30 *Maize*. About the last of July buckwheat and clover seeds are sown on it; the maize having been previously *manured*, plowed, harrowed, occasionally rolled, and left quite *level* without the least hill or ridge.*

30 *Clover*.

30

* New mode of cultivating maize.

30 *Wheat.**

30 *Clover.* Gypsumed in the spring; if not before on the clover sown on the maize.†

30 *Rye*

* Mr. Middleton, farmer on Pool's Island, informs me, that in December he gives his wheat a top-dressing of fresh dung from the stable, and then rolls it. In the spring he rolls it again, and " finds the wheat is improved, and greatly relieved from the *Hessian fly*. The dung gives vigour to the plants; and rolling smothers or crushes many of the eggs " or maggots."—Mr. Middleton, bred to the sea, is an excellent farmer; and has practised as above two years, for opposing the fly.

† Where the manurings are *frequent*, the quantity each time applied may be moderate: provided that on the whole round of crops they shall amount to a full manuring. The gypsum in this case may be only a bushel; the lime 20 to 40 according to the quality of the soil; the powdered limestone (or shells) 5 or 6 bushels; the dung 10 loads. These annually applied to the fields in rotation, one after another, will keep ground in good heart, where exhausting crops do not predominate over mild crops. Gypsum is not a manure to *all* soils. So of trench plowing; which improves most soils, but not all: and every farmer ought to try lime, gypsum, raw limestone or oyster-shells in powder, clay, marl, &c. in small, before he pronounces they are or are not manures to his particular soil. Applying manures *frequently in moderate quantities*, each time, is not recommended with a view to retard an immediate full manuring at once where it can be accomplished, especially respecting thin or poor soil: but we are encouraged to expect that frequent moderate applications of manure will answer our purpose; although not so suddenly yet as certainly as if performed at once.

30 Rye and barley. § A top-dressing with raw limestone, or shells, pulverized; 6 or 8 bushels an acre.

30 Turnips and potatoes 18 acres, beans or peas 12 acres.

30 Buckwheat plowed in: and in July sown for crop—Timothy seed on it. ||

—240

20 Homestead; including mansion, farm-yard, stackyard, orchard, &c.
260 acres, arable and meadow.

Products

§ Rye, for its meal and straw to live stock: barley for beer, &c.

|| On covering the *buckwheat seed sown for crop*, lose no time in sowing the *timothy*, leaving it uncovered. The same of *clover on buckwheat*. Settling of the soil; or rains, dews, or wind, will suffice for bringing the grass seeds to grow; or run a light roller over it: but beware that the soil is not left to crumble down or settle before the grass seed is sown. Suffer no time to run between sowing the seeds of buckwheat and grass: but perform the last as in the next breath after the buckwheat is harrowed in. If however, the sun be very powerful, it may be safer to cover the grass seeds with a very light harrow, or light roller. Many clover seeds are smothered by even small lumps of earth; and therefore more seeds are requisite than when left altogether uncovered.

Products of the Crops, by Estimation.

					C.
Maize	30 acr.	at 20 bush.	600 at 50 cents	30000	
Wheat	30	12	360 100	36000	
Buckwheat	60	12	720 50	36000	
Rye & Barley	30	15	450 60	27000	
Potatoes, &c.	30 (pot. 4 ^a = 800 ^b . turnips 14 ^a =				
	5600 ^b . at 8 ^c = 51200 ^c . Beans 12 ^a = 140 ^b .				65200
	= 14000 ^c .*				
Hay	60 ^a	120 T. at 1000 ^c		120000	
Clover, soiled	24; mow 4 =			60000	
Straw, husks and fodder of	90 ^a —exclusive of			18000	
	buckwheat straw.				
Buckwheat straw of	60 ^a			10000	
					402000

Which 402000 cents, by dotting off the two figures on the right hand are 4020 dollars.

Crops

* An acre ought to produce above 400 bushels of turnips or 200 of potatoes. Turnips when early thinned to about 12 inches apart, and well hoed, yield above double the quantity, and more perfect than what are scarcely at all thinned or hoed. Country people have not resolution to cut up plants in hoing, however thick they stand; as it seems to them robbing the ground. In estimates of crops, the cost of cultivation or lowest country price of products, for country consumption, is to be reckoned, without any regard to town price. For what is consumed by cattle on the farm, the value is received out of the stock maintained and fattened, including their dung and urine. An acre of 200 bushels of potatoes at 10 cents a bushel gives 20 dollars; when an acre of 12 bushels of wheat

Crops expended in Food to Live Stock.

Stock cattle are *kept*: others are *fattened*. The feeding is different. Cattle *kept*, need no kind of grain; and it would be waste to give it them; nor even *hay*, unless to cows about calving time. *Straw* with any *juicy* food, such as roots or *drank*,† abundantly suffices for keeping cattle in heart through winter, provided they are *sheltered* from cold rains. Mr. Bakewell kept his fine cattle on *straw and turnips* in winter. To the south of Pennsylvania stock cattle are *kept*, though indeed meanly, in winter on corn-husks and straw, without roots or drank or any aperient or diluent material that could correct the costive effect of the dry food; unless mayhap a nibble of a few weeds and buds, when they ramble abroad poaching the fields, and exposing themselves to debilitating cold rains and fleet. Water, often too

at 100 cents gives but 12 dollars. The feeding articles of produce being fairly expended *on the farm*, the soil is the better of it; but when they are *sold off*, the soil is soon weakened; becomes unproductive, and keeps the farmer poor as itself.

† The word *drank* is given us by Count Rumford, who understands as well the German as the English language; and in a work of his in English, *drank* is preferred, for distinguishing his composition from simple water as a drink. It is therefore preferred in the present work.

too cold to be drunk by them, is their only diluent : and how common is it to see them only sip and then turn away from their water, in winter ; especially when put to it early, before the sun has reduced its cold.

A member of the Bath Agricultural Society, for several weeks boiled all the *corn* given to his horses, and also gave them the liquor in which it was boiled : the result was that *instead of 6 bushels* given them unboiled, *3 bushels so prepared* answered, and preserved the horses in higher vigour, and in better working condition. A gentleman near Bristol confirms this fact by his experience ; and the inn-keepers have adopted the practice.—This practice coincides with the use of *drank*.

A Table

A Table of Food Expended on Live Stock.

IN ROTATION.

63

		Straw:	Hay:	Turnips:	Potatoes:	Meal:	Grafs:	
		Acres.	Tons.	Acres.	Acres.	Bushel.	Acres.	
HORSES:	winter <i>kept</i> , 4 summer foiled,	· · · ·	· · · ·	· · · ·	· · · ·	· · · ·	· · · ·	1
CATTLE:	winter <i>kept</i> , 70* cows, about calving time, <i>fattened</i> , 8 summer foiled	· · · ·	· · · ·	90 16 · · 8	· · 1	· · 100	· · 20	
SHEEP:	winter <i>kept</i> , 90 <i>fattened</i> 38	· · · ·	· · · ·	· · · ·	20 6 · · 2	· · 130	· · 5	
HOGS:	summer, foiled 90† winter <i>kept</i> , 8 sows and boars <i>fattened</i> ; 2 sows till May: 3 to 8 m ^o . old summer, foiled 8; and shotes 30	· · · ·	· · · ·	· · · ·	· · · ·	· · $\frac{1}{2}$ · · $\frac{1}{2}$ · · 3	· · 80 · · 150 · · 800	
Expended in lieu of cut grafs, in bad seasons; and re-ferved till new harvest; and for faddle and carriage horses; and for food to strangers or visitors horses,								
Remaining, unapplied,								
		60	31	· ·	· ·	· ·	· ·	460 2
		150	120	14	4	1720	30	

* See the two following pages.

In England cattle were wintered, *each*, with $\frac{1}{4}$ acre of straw, and $\frac{1}{10}$ acre of turnips. But above is allowed $1\frac{1}{2}$ acre of straw, and $\frac{1}{10}$ acre of turnips.—In general it may be reckoned that *cattle* eat, in *keeping*, $\frac{1}{4}$ acre of straw and $\frac{1}{10}$ acre of turnips, per head.

Dung.

Dung yearly procured from the above stock of cattle, sheep and hogs, may be; from the cattle 820 loads; the sheep, 180; the hogs 60: in all 1060

* Mr. Cook (drill inventor) supported in winter, 40 cattle near 7 months on 30 acres of straw, cut into chaff, and 4 acres of turnips; and saved from them 400 tons of dung. 28. E. Rev. 89. These cattle had their straw cut small, but the turnips were raw. Had the cut-straw and turnips been boiled together in water with salt, as a drank (a term convenient to be retained) it would have been of more advantage to the cattle. A drank for keeping cattle may be made thus: roots, chaff or cut-straw, and salt, boiled together in a good quantity of water: the roots cut or mashed. The cattle drink the water, and eat the rest. Drank for fattening cattle, thus: roots, meal, flaxseed, chaff or cut-straw and salt, well boiled together, in a plenty of water. If given warm, not hot, it is better. The 70 full eaters are thus stated:

Cows	48	Calves	8
Bulls	2	Yearlings	8
Oxen	14	Two years	8
	— 64	— 24 =	14
			64
			— 78
Off the fattened			8
			—
Winter full eaters			70

In the note under the article FARM-YARD MANURE compared with the above it may be seen that horned cattle were wintered in England, with $\frac{2}{3}$ ths of an acre of straw, and $\frac{1}{10}$ th of an acre of turnips: when in the above table is allowed 1 and $\frac{1}{3}$ d acre of straw, and $\frac{1}{10}$ th acre of turnips. In general

1060 loads.* At 10 loads an acre, the 1060 loads, together with the other manures proposed, is dung
E enough

it may be reckoned, in *winter-keeping*, one acre of *straw* and $\frac{1}{10}$ th acre of *turnips* are eaten by cattle each head. The above 70 cattle are supposed to yield 11 and $\frac{3}{4}$ ths tons of *dung* each. When Mr. Cook's gave but 10 tons each. His is pure dung without any straw; the other is from cattle *littered*; and therefore has some straw mixed with it.

† Lambs to drop about 20th March, 60: whereof raise 38 for supplying the places of 13 ewes and rams, killed at 4 years old, and 25 weathers killed at 2 years old. There may remain 20 lambs for sale. The winter *kept* sheep will be 52 ewes and rams, and the 38 lambs; together 90 head. The same numbers are soiled in summer. Not having seen any instance of *sheep soiled*, I only believe from certain circumstances and facts stated by writers that it would answer well, as with other beasts: and in Flanders, it is said, “their sheep are *always* in stables, and every day let into the yard, to breathe the air.” 20 An. 466.—Sheep are a necessary variety of live stock. Their meat is generally valued, and by many preferred. Their wool is essential in clothing. Their dung is rich. Hogs also give rich dung; and when attentively saved it is in good quantities. Sheep are to have hay or corn blades in winter with roots and salt: for fattening them add *Indian meal*. How would flaxseed or its jelly agree with sheep? The turnips and potatoes expended above, are more than need be for *keeping*, according to Mr. Cook; though too few for fattening.

* Cattle in England, when *fully littered*, have given twelve large loads of yard-manure, each, in the course of a *winter* only. During summer they ran on pasture. But in the pro-

enough for 100 acres. Twenty loads of such rich dung, to an acre, would be a good manuring alone: but the 1060 loads, laid on one of the fields of 30 acres, give above 35 loads an acre; which are abundant. A variety of manures is desirable: gypsum, lime, raw limestone and shells in dust, marl, clay, &c.

If no more live stock were kept, than should be necessary for labour and food on the farm, and all the crops were sold off, the income for a few years might, at the most, a little exceed what could be derived

posed case of cattle being housed through the whole year, though but partially littered, the dung being well saved, may be expected to amount to more than 10 loads each, of closer, richer manure. Mr. Bakewell was not in the practice of littering his cattle, till some years before his death: but he carefully saved their dung, by *daily* shovelling it up from their stalls, and storing it on the dunghill. A man and a boy attended to 40 head of grown cattle. Not having seen dung saved from sheep or hogs, my calculation respecting their dung is at random. Reckoning 5 sheep to a cow, it is then supposed they make but half as much dung as one cow, and the estimate should be under rather than over rated. The dung at the rate of five hogs to a cow, 68 hogs ought to yield 136 loads: but there are only 60 of hogs dung stated. Great *attentions* are due to saving their dung. Though hogs seem to make much dung, and it is very good, yet it is apprehended it will be long ere old habits will give way to American farmers adopting proper methods of saving this valuable article of produce. Geese penned every night on litter, would give dung worth the attention.

derived from a *full stock of beasts* kept on the farm, and *fattened* for the market. But how great the injustice to the soil! to what a heartless, unproductive state it soon would be reduced!—This it is which has ruined the fine lands in Maryland and Virginia—plowing much land, and selling off the produce, without reparation to the soil—This it is which, with idle or wasteful habits, rivets on country families frequent want, poverty, and debts, oft-times in the midst of a deceitful appearance of plenty?

It is presumed the soil of the farm under consideration is in good heart; and in a way of becoming better from a mode of farming far superior to what is seen in the countries, of America, south of Pennsylvania. In Pennsylvania and the eastern states, quick renewals of clover, in entire fields, are coming into practice; and with various manures are seen to restore abused soil, and yearly improve it. But in the countries of noted bad husbandry there is only seen, what is bragged of, here and there a *lot*, a *patch* of clover: a narrow aim at doing something. It feeds a favorite horse; but there is nothing done towards improving entire fields: no system or great object or design is in view. A third of the whole arable of farms sown with clover *yearly* upon small grain, and cut *one season*, then plowed in together with the remains of old stubble, might be expected gradually to improve soil from poor clo-

ver nibbled to stout clover cut. Whilst this course of improvement is in practice, all sorts of *manures* are to be unceasingly added. Here let it be repeated that, it is not immediate income alone which the provident farmer aims at: for whilst he wishes to obtain annual full crops, he knows it is necessary for the purpose, that the soil should be preserved in full vigour. His cares are therefore chiefly applied to the means of preserving and improving the productive powers of the earth: and he sees that no random pursuits can ensure a succession of advantageous husbandry.

INCOME, FROM THE PRODUCTS; BY ESTIMATION.

	C.	C.	C.
From WHEAT. Sold			36000
CATTLE.			
Veals 40 at 400 cents	16000		
Butter, 80lb. a cow, 384clb. at 20 C. . . .	76800		
Beef, 6 cows, 2 oxen, at 2275 C. . . .	18200		
		—	111000
Dung, 10 loads each, 820 at 50 C. . . .	41000		
		—	152000
SHEEP.			
Wool 400lb. at 25 C. . . .	10000		
Muttons 38, at 400 C. . . .	15200		
Lambs 20, at 150 C. . . .	3000		
		—	28200
Dung, 180 loads, at 50 C. . . .	9000		
		—	37200
HOGS.			
Fat 2 sows, 30 hogs of 10mo.—30 of 15mo. —10000lb. at 6 dols. per 100 }	60000		
Lard, of the intestines	3000		
		—	63000
Dung, 60 loads, at 50 C. . . .	3000		
		—	66000
Dls. Cts.			
2912.00	Total income	291200	
1164.80	Expences, 40 per cent	116480	
1747.20			
	Net	174720	
	The		

The Farmer whose passion is for cultivating *grain*—and all grain, here sees how inferior his income is to the productions from *live stock*. The maize, buckwheat, rye, barley, &c. are consumed on the farm; and the wheat is looked to for procuring money. But see the difference between *grain* at *market*, and *live stock* at *market*! The produce of the farm is 2912 dollars; of which only 360 are immediately from *grain sold*: so that the income from *live stock* is 2552 dollars—How superior the *live stock*! for the *soil*, and for the *pocket*! and that the corn (*grain*) is all consumed (except only the wheat) by the family and the *live stock*, to the amount of 1720 bushels. See page 63. In the Mus. Rust. anno 1746, is a detailed statement of nine years comparative experiments of the produce of a *grain farm* of 20 acres, against the produce of 20 acres of a *grass and stock farm*: when the *grass and stock* proved the *most profitable in net income* as 23. 11. 2 are to 9. 15. 6. The *grass and stock* neating 23. 11. 2 per annum, medium, and the arable or *grain farm* neated 9. 15. 6: a strong corroboration of our above estimate, as also is the account of *live stock stall-fed*, on the Hanoverian farms.

ILLUSTRATION, of the whole round of Crops during 7 years; with one Field continually in Meadow, during the Time of the Rotation.

Yrs.	A	B	C	D	E	F	G	H	8 Fds.
1	Tim.	Maiz	Cl.	Wh.	Cl.	Rye.	Po.	Bw.	
2	Tim.	C	W	C	R	P	B	M	
3	Tim.	W	C	R	P	B	M	C	
4	Tim.	C	R	P	B	M	C	W	
5	Tim.	R	P	B	M	C	W	C	
6	Tim.	P	B	M	C	W	C	R	
7	Tim.	B	M	C	W	C	R	P	

The crops of the *first year*, of this table, are particularly treated of in page 57; where it is seen that the rye field contains some barley; the potatoe field, some turnips and beans or peas: the maize field also gives buckwheat. The buckwheat field, which is next after the potatoe field, is sown with timothy seed, for giving a new meadow next year, which like the former is to stand out the renewed rotation of crops. This new meadow will be on field B. The next on field C. and so on.

In designing a recurring round of crops, their succession is to be tried on a plan or table, drawn for the purpose, by reading the table, and slightly marking it with a pen diagonally downward, and seeing that they run the same throughout; and moreover that there are not more nor less in the number of each sort in a year, any where in the table, than are in the first year among all the seven fields, or are in B field, during the seven years rotation. The table answering in these particulars, warrants a true, orderly course of crops and employment, which will recur for ever; but as the farmer may, in future, choose to alter it.

A sketch of a system of crops; in which one field is 7 years in hemp, and the same field is followed with timothy meadow another 7 years; whilst other 7 fields are in annual changes of various crops: so that of the 9 fields, 2 are in hemp or timothy during 14 years; and 7 in various rotation, recurring crops. Every field coming into hemp and timothy in time.

Years.	A	B	C	D	E	F	G	H	I	Fields.
1791	He.	Tim.	Maiz	Cl.	Wh.	Cl.	Rye.	Bk.	Po.	
92	He.	Tim.	C	W	C	R	Bk	P	M	
93	He.	Tim.	W	C	R	Bk	P	M	C	
94	He.	Tim.	C	R	Bk	P	M	C	W	
95	He.	Tim.	R	Bk	P	M	C	W	C	
96	He.	Tim.	Bk	P	M	C	W	C	R	
97	He.	Tim.	P	M	C	W	C	R	Bk	
98	Tim.	M	C	W	C	R	Bk	P	He.	x ^{1st Ro.}
99	Tim.	C	W	C	R	Bk	P	M	He.	
1800	Tim.	W	C	R	Bk	P	M	C	He.	
1	Tim.	C	R	Bk	P	M	C	W	He.	
2	Tim.	R	Bk	P	M	C	W	C	He.	
3	Tim.	Bk	P	M	C	W	C	R	He.	
4	Tim.	P	M	C	W	C	R	Bk	He.	x ^{2d Ro.}
5	M	He.	C	W	C	R	Bk	P	Tim.	
6	C	He.	W	C	R	Bk	P	M	Tim.	
7	W	He.	C	R	Bk	P	M	C	Tim.	
8	C	He.	R	Bk	P	M	C	W	Tim.	
9	R	He.	Bk	P	M	C	W	C	Tim.	
1810	Bk	He.	P	M	C	W	C	R	Tim.	
11	P	He.	M	C	W	C	R	Bk	Tim.	x ^{3d Rg.}

The ground, well prepared, is in April sown with *hemp*, and for 7 years successively, after being plowed and harrowed in the fall and spring, sometimes with *manure* added, it is repeatedly in hemp.

Timothy is to follow hemp; so that in the seventh year, the hemp being inned, and the ground plowed and harrowed fine, you sow *buckwheat* and *timothy* seeds, after the hemp crop.

This is continued 7 years in *timothy*, mowed once a year for hay; and now and then receives a top-dressing of *manures*.* When the 7th crop is off, plow in the fward neatly, and harrow and roll it in the direction of the furrows. The fward being duly smothered, heats and rots the better if done before cold weather. It rests thus till April for perfecting the rotting. Then list, cross, and plant maize.

Potatoes manured and well cultivated, clean and mellow the ground perfectly.

Hemp leaves the ground clean and mellow, therefore *timothy* is renewed after hemp. *Timothy* being sowed when the buckwheat is sown, the plants gain a necessary shelter from the buckwheat plants.

The *maize* culture cleans the ground, and pulverizes it after *timothy*, for future changes of crops.

A

* Why not generally give manure to *grass*, rather than to *grain*. Grain will receive the benefit to great advantage after grass. Ground that gives good *grass*, gives good every thing.

*A FARM YARD,**ADAPTED to the PRECEDING SYSTEM.*

It is an especial object in this design that the whole yard and its buildings, should be in view from the mansion; and that they be constructed at a proper distance, neither too near nor too far from the mansion. The food should be near to the housed live stock, for readily distributing it. The yard ought to be compact; and the doors of the buildings, and the gates of the yard, seen from the mansion.* Plate I.

The *homestead* includes this yard; together with its stackyard, the garden, nursery, orchard,† and some

* It is not to save ground that compactness is here desired; but that attentions due to the live stock may be performed in the readiest and best way. A yard containing cattle always housed, is never to be littered with straw, but all litter carelessly dropt on it, is to be raked off, for security against fire dropt on the way to the boiling house; and the beasts are not suffered to stroll about wasting dung and urine. When let out and watered, they are to be instantly returned to their stalls, regularly in detachments, one set after another. See pa. . On paper, an octagon form of a farm yard is pleasing to the eye: but the above is preferred.

† Beer is always certainly attainable on farms; but cyder is very precarious: therefore no more orchard need be established than would plentifully supply the farm with summer and

some acres of grass; enough for occasionally letting mares, or sick beasts run on, at liberty.

Explanation of Plate I.

1. Mansion.	10. Family yard.
2. Kitchen, Oven, and Ash-hole.	11. Pump.
3. Poultry-house, and yard.	12. Watering troughs.
4. Wood-yard.	13. Sow and Pig sties.
5. Laboratory (Labóraturess).	14. Cow-house.
6. Milk-house.	15. Boiling-house.*
7. Ice-house.	16. Hogs.
8. Pigeon-house.	17. Stercories.
9. Cloacas.	18. Barn.
	19. Sheep-house, and yard.

20.

winter fruit, for cookery and to eat. But in great fruit years, cyder may be made for family consumption, without ever laying out for it in quantities; though it might be better to sell the apples. *Beer* is the most wholesome of all made drinks,—the chief in all the countries where robust health is the most conspicuous. It proved on my Wye farm, very excellent to harvest men; who preferred it to rum; and it kept them in steady good heart, without any instance of such irregularity as rum commonly produces.

* The Boiling-house here may be too near to combustibles, hay and straw. Leaving this spot for *Swill-cisterns or tubs*; the boiling would be better at 29. Which might, so near the mansion, also contain a brewing and distilling apparatus. If *hemp* is in the round of crops, it may be ricked at 30, and *broke and swingled at a house at 31.*

20. Chaise-house and stable.	29. Boiling-house.
21. Waggon and cart-house.	30. Hemp in ricks.
22. Implements of husbandry, house.	31. Hemp here broke and swingled.
23. Workshop.	a. Treading-floor.
24. Herdsmen's hovel.	b. Straw ricks.
25. Granary.	c. Hay ricks.
26. Stable, for farm.	d. Root pits.
27. Area of bridge and vault.	e. Kitchen garden.
28. Bees.	f. Nursery, &c.

The *Mansion*, is airy on every side. The offices, being on the northeast and northwest *angles*, leave the mansion open to the south, the east, and the west, in a clean lawn: and from the north rooms there is a view of the farm yard and its business.

The *Kitchen*, has its oven and ashhole: this last opening out of doors, for avoiding the dispersion of ashes, in the kitchen, on moving them for use. No stairs proceed from the kitchen; as it would be a passage to dust and down from the bed-rooms to the kitchen: the ceiling ought also to be water-tight. Lay an arch of brick over the ashhole and oven, as a barrier against fire, the stairs may be over the arch, from without. Indeed here might a *wash-house* have its roof extended, for covering the stairs. Inadvertently, the wash-house is omitted in the plan: but the laboratory may be used for washing and ironing.

The

The *Poultry-house and yard* are roomy ; and kept sweet by being frequently cleaned out ; and fresh sand and gravel are strewed in the yard. Their food may be steamed potatoes and meal, in winter ; cut grass, potatoes and a little meal in summer. Poultry ranging at large, feed on grain, seeds, grass and insects. Gravel is necessary to them. In Languedock, geese are fattened as follows. After they are in full flesh on green food, the fattening of them is not to be delayed, lest the season be lost. About the end of December they begin to couple ; after which they cannot be fattened : soon as frost arrives, especially about the end of November, they are shut up, never more than 10 or 12 together ; in a dark place, quite free from light, and where they cannot hear other geese. Here they remain till quite fat. This moment is to be seized for killing them ; otherwise they soon become lean, and at last die. A trough is filled with rice, to be eaten by them at pleasure. Rice makes them very delicate. Others give them boiled maize in the grain. The coop is kept very clean. In two or three weeks they are quite fat ; they then are let out, to go at large in water 24 hours ; without which the flesh has a disagreeable flavour. Probably malt, barley or oats, would succeed well, as their food. By an accident it was found that coal for them to nibble (I understood it to be *charcoal*) promoted their fattening greatly at sea. Treat ducks in the same manner.

If

If a *chicken* is not fat in a week, it is distempered. Poultry are fattened in coops kept very clean. Give them gravel, but *no water*. Their only food is barley-meal mixed with water, thin enough to serve as drink. Their thirst makes them eat more than they would, for the sake of extracting the water from among the food. This is not put in a *trough*, but on a *board*; which is *washed* clean *every time* that fresh food is put on it. It is foul and heated water which gives the pip. Salt is said to be a poison to fowls: it may be so, as a caustic, when they swallow grains of it: but how would it answer when dissolved in water, not stronger of salt than sea-water, and offered them in a vessel separate from their fresh water?

The *Laboratory* (Labóratûre), is designed from one invented by my valuable friend, the late Mr. *Lawson*, of Fonthill, which answered many purposes in country house-wifery. No better name occurs for distinguishing it from other houses on farms. See a section of the house in Plate II. No. 1. and a further account of it, in the explanation of the cuts.

The *Milk-house*, may be joined to the *Laboratory*, and this be a scalding house to it; or it may be detached from the *Laboratory*, and funk two feet under ground. The offal milk is conveyed to the
pigs

pigs in wheel-barrows, and might be conveyed through a tube, under ground, to the pig-stie. *Ice* is at hand for hardening butter as it is taken from the churn and worked on a cold marble table. *Water* cold from the pump is ushered through pipes to an upper shelf, and passing round the room, falls on the under shelves and runs off.

The *Ice-house*, will be best detached from the milk-house, that it may be clear of all moisture, and receive air on all sides. The ice-house at Gloster point, near Philadelphia, strongly recommends that it be chiefly *above ground*. Four feet under ground, six above ground and twelve square, would hold 1440 solid feet: which is enough for family and milk-house purposes, though very freely expended.

Pigeon-house. Pigeons feed expensively, when it is alone on the corns: but they also feed on many wild seeds. They make an agreeable variety on the table; but ought not to be suffered to become too numerous; and therefore their house is to be of a moderate size; build it rather capacious in *area*, than in height or with many ranges of nests.

The *Family-yard*, is a barrier against farm-yard intrusions. It is covered with a clean, close sward of spire grass. Its margin alone may be admitted to grow flowers. It is fenced by a sunk fence; on the

the top whereof may be, a low, light palisade; which with the bank may be hid by rose trees planted in the ditch, which is to slope gently *up towards the mansion*. The white rose bush or tree is the hardiest, tallest and handsomest sort; but the damask is best for yielding the fine distilled water.

The *Pump* serves both family and farm-yard purposes, and is worked by a brake or handle on either side of the palisade. This large expense of water is advantageous to its quality. The pump nozzle delivers the water 5 or 6 feet above the surface of the ground: and at every time of its being worked, a portion of the water is delivered into a vessel, from whence proceeds a tube three feet under ground (for avoiding *frost* and *heat*) to the kitchen, where some of it is deposited in a cistern: the rest proceeds also under ground, to the milk-house; only leaving on the way a small part in a receptacle of the mansion for wash-bason uses. For the boiling-house, which takes much water, either the water must be conveyed through pipes, or in casks on barrows, or a pump is to be placed near the boiling-house.

The *watering troughs* are to have plugs in their bottoms; that when the cattle have drunk, the remainder of the water may be *immediately* let out. Instead of letting cattle out to water, it may be advantageous to convey water to them in their stalls
through

through pipes, at two or three stated times in the day; and after allowing them time to drink, let the remainder out of the trough, for avoiding staleness or warmth in the *summer* and frost in the *winter*. Besides, suffer the cattle out to strole about the yard and rub themselves daily, a few hours; 11 or 12, to 3 o'clock.

The *sow and pig sties*. The offal milk may be conveyed to the troughs in the sties, from the milk-house, by pipes under ground or otherwise. Sticks in a frame are so fixed over the troughs, rack like, that the hogs cannot get into the troughs, further than their mouths. The swine are to be kept clean, and littered in their shelters. Salt water may be offered them in the pen.

The *cow-house*. Hay and straw are ricked at the back of it; the house is 16 feet wide, including its passage; 7 feet pitch for the cattle to stand under; and above this 7 or 8 feet pitch to the joists and rafters. Into this upper part straw and hay are pitched up, to be at hand; and used especially in bad weather: from whence it is thrown to the passage, to be given to the cows. Wheel-barrows of drank pass along the passage to the cattle cribs. These barrows carrying heavy tubs or barrels of drank, would pass with more safety and steadiness, with two wheels; such as every farmer can make, inde-

pendently of wheelrights, by doubling inch plank. In one corner of each crib is to be at all times a salt-lick in a firm mass of the purest impalpable potter's clay or fuller's earth saturated with salt. The very important article, *salt*, is shamefully neglected, in common. A *stercory* is in front of the cow-house, within easy pitch of dung from shovels. Carts never need to pass between the stercory and house: so that the space is designed only for the cattle to pass along to the doors of their stalls. The dung is carted away from the further side of the stercory.

The *boiling-house* contains also the conveniences for *steaming*. Care is to be taken that fire cannot be blown about, and mix with any straw nearest to it. For the apparatus for steaming, see plate III. fig. 3.

The *stercories*, may be 4 feet under ground, 2 or 3 above; and walled. Over them may be supported, by short standards, a covering of brush-wood or straw, which will exclude the sun, but let through rain. It would be saving labour, and answer other good purposes, to cart the *dung* out of the *stercories*, to the *head lands* of fields meant to be dunged or manured; there *mix* with the *dung*, three times its quantity of the *earth* taken from the head land; and once *mixing it well*, may be better than repeating

iog

ing it: as often turning the compost may weaken it as a manure, and even check its fermenting.

The *barn*, 32 to 36 feet wide, has a passage its whole length, and stalls on each side of the passage. Straw is cut in the passage, and the cattle are fed from it. At the south end of the house, a bridge is raised from the ground up to the second floor, about 8 feet from the ground. The bridge is the width of the barn, and has an easy ascent for loaded waggons. Under it, next to the house, is a vault, for storing roots, also the width of the barn, by 12 or 15 feet, and 6 or 7 feet deep. At the end of the passage a door opens into the vault. The second story is high enough for thrashing in.

The *sheep-house and yards*, are to be roomy and airy in divisions. Back of the house is the hay requisite for the sheep, in ricks. Its stercory is at one end. The dung is to be carried to it in large wheel-barrows.

The *granary* had better be longer and narrower than in the drawing; with partitions across it, without any communication between the rooms; by which the different corns will be kept from mixing, and a general access to the rooms will not happen when only one sort is to be carried in or taken out. A lock is to be to each of the several out doors.

Windows facilitate thefts. There needs none to the lower rooms, if an air-hole be between every two joists, close under the second floor, the vapour and heat naturally ascending will pass off at the air-holes. The pitch of the rooms may be only $6\frac{1}{2}$ feet.

Bees. From instructions given by an English writer, I tried bees in *lateral boxes*. On the first experiment, in the morning of the first of November 1787, after a cold night, the bees being all housed, a pair of the boxes were leaned on one side, and shewed the bees were all in one of the boxes : on which the other box was taken away ; and proved to be full of comb and honey, perfectly pure without an atom of any thing foreign. Not a bee was killed or even disturbed. This was on Wye Island, where the bees had half a mile to fly over the river before they could reach the main. Many at times must have perished, in rains and storms, whilst they were endeavouring to cross the river ; and the distance in returning from the fields exhausted their strength and retarded returns of honey, so as to render their particular situation very ruinous to them. In the next summer, a very wet one, they were reduced ; and it being a bad season for honey, they all died in the winter, though no honey was taken from them. The boxes were exact cubes of 10 inches, clear. The method is promising.

The

The *treading-floor*. Though but six or eight horses should tread on it, yet it ought not to be of a less diameter than 80 feet ; and the track or bed of wheat is narrowed accordingly. I was long and greatly prejudiced against *treading* wheat. But experiencing the advantages of getting out the crops with *speed*, and very *clean* when on a permanent well preserved floor, with horses gently trotted in ranks, airy and distant each rank from the others, the preference in my opinion is in favour of treading, over the most expert thrashing with flails. So much so that, considering the greater opportunities for the thrashers pilfering, and the greater length of time of their troublesomeness whilst thrashing out the crops, I would prefer treading to having my large crops thrashed for nothing.

C L O V E R.

This is an important article in the improved system of crops in rotation : but its seed bearing some price or costing *some* labour to obtain it, renders it a bugbear to common husbandmen, whose habits have diverted them from a large use of it. It is indeed absolutely necessary that clover should be a common crop in rotation with other articles of crop, in entire fields. It is hoped there are farmers spirited and determined enough to defeat popular objections ; and who will consider the cost not chargeable merely to

the

the crop of clover, but to the whole round of crops; the clover being so essential thereto that without it the soil, the cattle and the corn-crops would greatly suffer; and the farmer's income, his reputation, and his independency would be lessened.

If 4lb of clean clover seed, when sown with such a box as is described below, clothe the ground as well with plants as 10 or 12lb sown in the common broad-cast way and *covered*, of which I have had a little experience, then a bushel of seed will sow 15 acres. The farmer can ameliorate 100 acres with clover more certainly than he can 20 from his scanty dung-heap. While his clover is *sheltering* the ground, *perspiring* its excrementitious effluvium on it, *dropping* its putrid leaves, and *mellowing* the soil with its tap roots, it gives full *food* to the stock of cattle, keeps them in heart, and increases the *dung-hill*. Nor is the amelioration by clover very inferior to that by dung, as this is commonly managed. In some respects it is preferable. With dung innumerable seeds of weeds are carried out and sown on the fields: not so of clover, when the seed has been properly cleaned. Clover is the best preparative for a crop of wheat. Dung inclines wheat to run more into straw than full grain. Wheat on clover has the best grain and the fullest crop.

A farming friend of Chester county, gave me a
pleasing

pleasing account of an improved method for gathering and cleaning clover-seed. In general the heads of the clover are rippled off, by a simple machine moved by a horse, at the rate of 5 acres of them in a day. The heads are carried to an oil mill, having two stones rolled in the manner of a tanner's bark-stones which separates from the haulm, five bushels a day.

Of two fields, 50 acres each, in clover, one is kept up for giving seed in August, after cutting the early growth. In 10 days the 50 acres of seed may be gathered at a small expense; and in 10 more, 50 bushels may be separated from the haulm, and cleaned with a fan or with sieves. Whatever may be the medium produce, I count on only one bushel of seed an acre.*

A box

* Mr. L'Hommedieu, of New-York, says: "The seed is collected both from the *first* crop and from the *second*: but the largest quantity is from the *first*. By sowing three or four pounds of clover seed to the acre, on light loamy soils which yield 8 or 10 bushels of wheat or rye to the acre, the clover will not be profitable to mow: but standing thin on the ground, the heads will be well filled with *seed*. These fields are kept up the next year, till the seed is collected. When above one half of the field has changed its colour by the drying of the clover heads, then begin to collect them; which is done by a machine drawn by a horse and guided by a man or boy, who will collect from the field by this means, the heads of clover growing on five acres, in one day. The machine (see the plate) is an open box of about 4 feet square

A box for sowing clover seed on flat wheat *beds* (rather than ridges) five and an half feet wide, exclusive

at the bottom, and about 2 feet high on three sides. The forepart is open; and on this part are fixed fingers, similar to the fingers of a cradle, about three feet long, and so near together as to break off the heads from the clover stalks, which are taken between those fingers. The heads are thrown back into the box, as the horse walks on. The box is fixed on an axle-tree, supported by two small wheels about two feet diameter. Two handles are fixed to the box behind, by which the man or boy at the same time he guides the horse, lowers or raises the fingers of the machine, so as to take off all the heads from the grafts; and often as the box gets full of heads, they are thrown out, and the horse goes on again. This machine is seldom used to collect from the *second* crop. Those who do not own one, suppose the expense of hiring with the loss of seed trod down, nearly equal to the expense of mowing the second crop. On rich lands, ordinarily, no seed comes of the first crop. If the land is lightly manured or otherwise very good, the first crop of grass is so thick that it yields no seed worth gathering: but the second crop being shorter and thinner is commonly well seeded. Sometimes, indeed, considerable quantities of seed are gathered from the first crop, on land where wheat is cut the same year: the stubble preventing the clover from growing too thick for producing seed. The second crop of grass in good land is mowed so high as to cut off the heads of clover, and as little of the grafts as possible. A man in this manner will mow 2 or 3 acres a day. The time of mowing is when at least one half of the heads become dried. It is raked immediately into *small heaps* or cocks. In what manner soever collected, all ought to be put into such heaps in the field, and there exposed that the husks may rot (about three weeks) or otherwise

clusive of the water or opening furrow, seven feet inclusive, was made of light half inch boards, for the sides, bottom, and partitions. It was seven feet long, five or six inches wide, that the seed lying thin may easily shift about and not press heavily on the outlet holes.* It was three inches deep, and divided into

the feed will be got out with great difficulty. Attention is to be paid to the heaps, lest they rot too much next to the ground. If much rain falls, the heaps are to be turned. When the heaps are sufficiently rotted and dry, known by rubbing some heads in the hand, cart them into the barn; and afterwards thrash out on the barn floor, and clean with a wire riddle. It was an extraordinary quantity of seed that I once knew produced 1 bushel and 4 quarts from $\frac{1}{4}$ of an acre; equal to $4\frac{1}{2}$ bushels an acre.”

* The 7 feet lands were preferred to $5\frac{1}{2}$ feet lands which had been before used (the farm a very level, strong wheat soil). The clearing out or water furrows were included both in the 7 feet and the $5\frac{1}{2}$ feet lands. After making a number of instructive experiments on eleven acres; of wheat harrowed in and compared with wheat at the same time plowed in; of wheat sown on a broad level, on round ridges of various heights, and on flat beds having deep parting furrows, the ridges and beds with their water furrows being 7 feet wide, and running some N. and S. others E. and W. I clearly preferred beds to ridges; because it is immaterial in what direction they lie, the sun shining equally on the whole horizontal surface of the beds; because the soil being alike in quality on the whole of the bed, the wheat grew equally well from edge to edge; because therefore, in reaping, the wheat was better saved, there not being short wheat as on the edges of ridges;

into seven parts, each division or receptacle having two holes bored through the bottom, half an inch diameter, and placed diagonally. The holes were singed with a hot iron rod to smooth them. Square pieces of strong writing paper, (any gummed paper) were pasted over the holes, on the inside of the box. A hole was burnt, with coarse knitting needles, through

and because the furrows being opened deep the greatest rains presently glided into the furrows and were by them conveyed into the main drains of this flat land, without ever drowning or scalding the growing wheat, or hardening the ground on the flat *beds*. Upon the *ridges* E. and W. the wheat on the north-side was inferior to that on the south-side. This of the ridges raised something higher than is common. On the highest ridges, which were in the extreme for a strong contrast, the wheat on the north-side was nearly all dead, in the spring. In *ridges* the best soil is heaped in the middle; and the thinner soil at the edges gave short straw and mean grain, much whereof was lost in reaping and gathering. The *ridges* formed receptacles of rain which were angular at bottom, so that rain water rose suddenly half way up the sides of the *ridges*, and eventually hardened the ground on them, as well as drowned or scalded much of the growing wheat. On *ridges*, clover is more exposed to frosts, winds, and washing of the earth away from the plants, than when on flat *beds*; nor is it so advantageously mowed. My *beds* were separated by deep water furrows, formed by a double mould board plow dipt deep by the power of only two horses, not large, and which had a good share of the English race blood in them. This mixt breed bear heat well, are brisk, and willingly exert their powers. Plate III. fig. 8.

through each paper; and trials were made with seed gently shook in the box, over a floor or carpet; and the holes are enlarged as far as there may be occasion for dropping a due quantity of seed. It was used for sowing turnip seeds: the old papers being taken off, and new ones pasted on; and then holes burnt suitable to turnip seeds. At about a third of the distance from each end of the box were fastened strong leathern straps; by which the box was held, and a little agitated in carrying it before the seedsman, in a direction crossing the beds, whilst the seedsman walked along the beds. Plate III. fig. 5.

The only comparative experiment made by me, of clover seed sown with the box above described, against broad cast sowing, was thus: In the moment when a seedsman long used to sow clover seed, was sowing seed in the chaff at the rate of 12lb of clean seed, according to his estimation, clean seed was sown on several lands or ridges of growing wheat, with the box. After sowing about 200 yards in length, the seed put into the box did not appear reduced in quantity, and I feared it was sown too thin. But the growth from the box sowing, proved to be thicker and much more equally distant than that from the broad cast, and the plants were sufficiently close. These operations left the seeds on the ground of the field of wheat without any means used to cover them. The time of sowing was about the

middle

middle of March, whilst there were yet light frosts. It was a season in which I often had clover seed sown in the chaff, and left it uncovered, without ever experiencing any loss or disappointment.

When clean clover seeds are sown on a clean ground and harrowed in, numbers are smothered under small lumps of earth as well as under larger ones : not so of seed left on the ground uncovered *during the frosts*, in March rather than earlier. It therefore seems proper that much more than 4lb an acre should be sown, when the seeds are to be covered.*

Wheat on Clover.

The language of English farmers on this head is, that wheat on clover is to be sown on “one earth”—one plowing. To conform to this idea, I conducted this business on 15 acres, in this manner :

1. The clover having been cut once and then pastured, though not close, was turned in deep and the furrows laid neat and close by a plow.
2. The wheat was sowed, broadcast.

3. The

* Mr. E. is lately returned to America from a second visit to England, and is confirmed in his former opinion that clover is better in Pennsylvania than in England; merely, as he thinks, from the soil or the climate of America being more suitable to it. See page 27.

3. The harrow followed twice, in the same direction in which the clover was plowed in.

4. The sown wheat was then rolled ; though rolling did not appear to be necessary.

The crop stood well and yielded satisfactorily. It grew near two miles from my other field wheat, on a soil not quite similar ; so that a just comparison could not be made between them. The operations immediately followed each other, without any pause. The plow, the harrow, the seed, &c. were all ready on the spot, before the plow proceeded.*

Mr.

* Mr. Macro's experience is against this *immediate* sowing upon plowing in the clover ; and his experiments were *repeated*; mine a *single* instance, which proved highly satisfactory, *in general*, without any pointed *particulars* occurring of a much superior produce. Mr. Macro gives the following encouraging detail of his practice and success. "From upwards of "20 years experience," he says, "I am of opinion that, the "best way of sowing clover lands with wheat, is to *plow the* "land 10 or 14 days before you sow it, that the land may have "some time to get dry, and after rain enough to make it dress "well, lay on the seed in September, two bushels an acre ; "in October, three bushels an acre ; and in November, four "bushels an acre." These quantities of seed are here mentioned from Mr. Macro, for the entertainment of farmers in America ; who may wonder that difference of climate or soil, should admit of such difference in the quantities sown : America, three pecks to a bushel of seed :—England, two to four bushels, an acre ! The atmosphere in America is dry in comparison to that in England ; the English atmosphere abounds

Mr. Young was requested in Ireland, to instruct the farmers of that country in proper courses of crops

more in humidity than the American ; and affords drink and with it *food to more plants* than the humidity of the air in America can bestow. It seems, he plows in the clover on a fall of rain, and then waits for a due state of the ground. "The furrows, he continues to say, ought not to be more than 8 or 9 inches broad : less is better if the plow turns them well ; and the two last furrows should not be lapped one on to the other, but plowed so as to leave a space of near two inches between them, for some seed to fall in. I am at a loss, he says, to account for the *wheat thriving better on lands that have been plowed some time*, than it does on *fresh plowed lands* which dress as well or better : but I have often tried both ways on the same lands, and always found the former answer best." 1 An. 109. I conjecture that the clover plants being buried, and the wheat sown at the same time, they both ferment and run into heat in the same moment : the germ then shoots and the root is extremely delicate and tender for some days ; during which the buried herbage obtains its highest degree of heat ; which added to the internal heat of the germ may, though only slightly, check and a little injure the delicate shoot of the wheat. In sprouting barley for making malt, a little *excess of heat* in the bed, checks, and a little more totally stops the sprouting or growth of the roots. Both modes, give crops superior to what are produced from wheat sowed on fallow. Farmers may well try both methods, for determining which to prefer ; that is, as well in the *immediate* sowing, on plowing in the clover, as in the method of sowing not till 10 to 14 days after having plowed in the clover : suppose an half in each way. Both modes are excellent. In letting the soil rest 10 to 14 days

crops. In directing them how to sow wheat on clover, he says; “The clover is to be well plowed in,

an opening is given to heavy rains consolidating and leaving it in an inferior state for receiving the wheat seed. If rain falls after burying the clover, and before sowing the wheat, it may sometimes be necessary to wait for the ground becoming only moist, rather than sow when it is wet and heavy. If the farmer plows in the clover when the ground is *dry*, he may then choose to wait for rain before he sows. Though for this reason *alone*, he need not wait. I have found it generally safe to sow during a drought, when the soil is very dry: but not when a light rain has fallen on the very dry ground. In the former case the seed is safe till a rain falls, which is usually in plenty after a drought: the seed now quickly grows up: in the other case it is slightly damped, and it swells; but the moisture is so soon and totally evaporated as to leave the seed to dry-rot and perish. There may have been some peculiarity in Mr. Macro’s soil: yet it probably was but a light soil, little liable to be hardened in 10 to 14 days; as on a rain strong wheat land would. Farmer *Klyogg*, the Swiss, says that *wheat* shoots strongest when there is an *interval* between the time of plowing and sowing; but that *barley* is most vegetative when sown immediately after the plow.”——Of all the modes of sowing wheat, I am strongly persuaded that in *clusters* it gives the best crops. A number of experiments made by me are the foundation of this opinion. These experiments were made at Wye in Maryland. There I invented a simple strong machine which dropt 5 or 6 grains of wheat in each cluster on above 8 acres. The clusters were 7 inches apart in the rows; and the rows were about 9 inches from each other. A horse on each side of a bed walked in the water furrows and sowed an entire bed in 8 rows at a

in, with an even, regular furrow; and the wheat sown and harrowed well."

One

time. A light pole extended between the horses, from the neck of one to that of the other. Accounts of some of the experiments were published in the Columbian Magazine: and it appeared from them that as far as 9 grains in a cluster, (being no further tried by me) and from Mr. Singleton's experiments, made at the same time in Talbot, as far as 15 grains in each cluster, the produce in wheat was progressively the better. At that time I had never tried wheat sown on clover plowed in: but the machine was perfectly adapted to clustering wheat on ground in that state. The following mode of sowing and cultivating wheat and clover may be introduced. Clover is to be plowed in deep and the furrow neatly turned. On this is drawn by a horse walking in the water furrow on each side the bed, a machine which should open the ground about two inches deep in rows 8 inches apart, and in the rows drop seed wheat in clusters, each cluster consisting of 8 or 10 grains, at 6 inches apart, equal to about a bushel to an acre. The whole bed is finished in the horses walking once through the furrows. In November, a sham of several blades or hoes 6 or 7 inches wide, and fixed in frame should cut the ground between the 8 inch intervals of ground; which, cutting up the weeds and stirring the ground, would leave it in good condition till March or early April; when the sham should again clean and stir the ground, and eradicate the very injurious May-weed and Shepherd's purse; and at the same time with the clover seed box and seed on the frame of the sham, by jogging the box the clover seed would be sowed, immediately after the sham. This also is performed by the horses walking in and being confined precisely by the water furrows. A light barrow or rake may be attached

One of my neighbours intending to sow wheat on clover, plowed up the clover a week or two before feeding time ; and then gave it *a second* plowing, across, and sowed wheat on it : whether the wheat was plowed or harrowed in, I know not.* Vast numbers of roots of the clover were turned up,

G and

to it. In clustering wheat endeavour to drop the feeds all in a heap, in contact with each other if it can be. They thus proved greatly superior, dropt in small holes made by a dibble, to the same number of grains spread within circles of three inches, the centres whereof were 7 inches from the centres of other like clusters ; when the dibbled holes were only 6 inches apart. Besides sowing clover seed in the moment of shimming, gypsum, lime, or rotten dung, may also be dispersed as the machine proceeds in shimming, thus : In 7 fields the rotation consists of,

- 1 Roots, the ground dunged beforehand.
- 1 Spring grain ; in sowing it, in the same instant and motion, clover seed is scattered with it from the box, and strew on each acre, lime 12 bush. gypsum 1 bush.

1 Clover

1 Wheat and clover feed, with 12 1

1 Clover

1 Rye or Barley and clover feed, with 12 . . . 1

1 Clover or Pulse

7 Fields

* Had not this been plowed *a second time*, it would have been precisely in Mr. Macro's method : but the second plowing overset the good work.

and left standing erect above ground, all over the field. Here was unnecessary labour, an useless and even injurious plowing, by which the manure from those substantial roots and a part of the green herbage, was lost to the crop of wheat.

Another neighbour proceeded thus, in sowing *wheat on clover*:

1. Plowed in the clover, *deep*.
2. Harrowed.
3. Rolled.
4. Sowed wheat.
5. Plowed it in, *shallow*.
6. Harrowed it, in the same direction.*

BEANS.

* Whilst the former copy of this was at press, an account of the effect of this experiment was expected from the experimenter; but I was obliged to speak of it from memory, which proved to be incorrect, and that part is now omitted. Mr. *Singleton*, of Talbot, walking in his wheat field, was surprised to find the growing wheat much superior on the meaner soil of the field; it being higher with stronger straw and larger heads. This part of the field *had been in clover*, which was *twice mowed*, and in August broke up, and sowed with the wheat the first of September. The other part had the *clover plowed up in March*, for tobacco: but tobacco being laid aside, this ground was then *repeatedly plowed in the summer as a fallow*, and sown also the first of the same September, with wheat: from which it yielded $14\frac{1}{2}$ bushels an acre; when *the part twice mown and but once plowed gave $24\frac{1}{2}$ bushels an acre*. The difference is great: to which add the value of the clover

BEANS.

Let not the novelty or labour of sowing beans in field husbandry be made a difficulty to the application of them in a rotation of crops. They may be dropt by hand. But a simple and cheap machine may be made for dropping them in clusters, as quick as a horse drawing it can walk. Two wheels made of inch plank doubled, turn an axis of about 5 inches diameter, having notches on one line round it, from each of which 3 or 4 beans are discharged at the same moment into a furrow opened by a plowshare or wooden coulter, the ground being first well prepared. A stave at the tail of the machine may serve to cover the beans, if occasion : though the ground, being mellow, always tumbled in on the beans, with me. If the wheels be two feet diameter, they will have a circumference of 75 inches, which divided by $10\frac{1}{2}$ inches, give 7 for the number of notches round the axis, for dropping the beans, in clusters, $10\frac{1}{2}$ inches apart in the rows. With such an instrument beans were drilled for me, at Wye.*

G 2

NEW

crops and the saving of plowings. They abundantly prove the superiority of wheat *on one earth*. Mr. Singleton is to be depended on, and keeps a diary of his farming business.

* Husbandmen have frequent occasion to discover the diameters of circumferences as well as the circumferences of

NEW PRACTICES in the CULTURE of MAIZE and WHEAT.

The common modes of cultivating the various corns, are every where familiar: but the following practices and observations are upon new modes, or particular branches of the business.

In Maryland, most of the wheat sown is amongst maize, whilst it is ripening in September. The farmer is urged to sow wheat early, for avoiding damage from *rust*, and from *storms*. A storm upon maize having the tops on, would prostrate or entangle the tall stalks, so as to render plowing in the seed wheat difficult and less perfect; and the farmer dares not cut off the tops till after the wheat is sown and covered; because in plowing in the seed, the swingletrees catching and bending down the stalks and then suddenly letting them go with a spring, throw off the ears of corn with some force; which with the tops and tassels on would be considerably resisted. Another mischief is common, as well from
horsehoing

diameters. In common, for finding a circumference, the diameter is multiplied by 3: but it is more exactly ascertained by multiplying with 3.1416. The difference on 5 inches diameter is near $\frac{3}{4}$ ths of an inch; it being as 15.7 to 15. The *circumference* known, to find the *diameter*, multiply the circumference by .31831.

horsehoing the maize as plowing in the wheat, which is that the roots are torn or cut by the plow-share.

For avoiding the above mentioned mischiefs, and that the seed wheat should be covered solely by plows; and also that the wheat should grow on perfectly flat beds, and the plowshares work partly above the mat of fibrous roots of the maize, I introduced the following practices in my maize and wheat culture, which was on very large fields.

Observing much irregularity in the standing of maize in the rows, which prevented plows from working sufficiently near to the plants for covering the seed wheat, and that much was left for the expensive and often bad work of handhoes to perform, I caused the maize seed, after listing and crossing, to be carefully placed close to the *landside* of the furrows; not dropt in the careless scattering manner usual. The maize thus grew very straight in lines, and admitted the plows to pass near the plants. These being up and a little grown, the design was formed of directing the first or finger-like roots to dip deeper than common before the lateral roots should strike out. The soil was plowed full five inches deep; and turned at first from the maize, on both sides of the plants: but they being then very young, it was necessary to leave more shoulder or bed

bed to them than was desired, to avoid burying them with the earth falling back: therefore the plow, on having worked through the field, immediately returned to the place where it began to plow from the plants, and it now took off as much more earth, still turning it *from* them, on each side, as they could well bear without danger of their tottering. All now *rested* 10 or 12 days, even in the driest weather, with intention that the lateral roots should take their direction under the *artificial surface* of the ground formed by the plowshare. The plows next turned a furrow, on each side of the rows, *to* the plants, through the whole field; and then plowed through the balks or whole of the intervals not before plowed or horsehoed. The handhoes performed as usual, except that hillling was wholly forbidden. Soon as plowing through the intervals was finished, the plows again plowed *from* the plants: and so repeatedly continued to plow through the intervals alternately *from* and *to* the rows and plants; whereby another important purpose was answered: the keeping the whole field *level*, for growing the wheat on *flat beds*, and avoiding *ridges* or beds at all *rounded*. The alternate plowings *from* and *to* were continued even during the forming and filling of the grain, as far as was requisite for keeping the ground *clean and stirred* to receive the seed wheat; and it was a continual work to the plows, in which the plowshares passed

passed rather over the roots which spread and ran deeper than if they had taken their first start under the common surface of the earth, and therefore they were not torn up, or the plants fired or checked in their growth. Thus at the time of sowing wheat the ground was so perfectly clean, fine and light, that for several years successively, *half a bushel* of wheat sufficed for seed to an acre.* This thin sowing occasioned some attention by other farmers, and a neighbour came to see the seedsmen at work. He examined them separately, they were two; then measured the distance of the maize plants from each other; saw a portion of the seed measured and sowed; then counted the clusters of plants that the portion of seed extended to when sown; and he seemed satisfied. He was not a man of many words, and I asked no questions. Great advantages were obtained in cutting off the maize tops before sowing the wheat; which in common would be improper, where wheat is to be sowed on maize. That the swingle-trees might not hang on the maize-stalks, the rope traces were half buried in

* The stoutest, most promising crop of wheat I ever had growing was of 200 acres, from a small fraction less than half a bushel of seed per acre. Whilst this very flattering crop was in head, *rust* and *scab* (empty ears) reduced the crop to a very trifle. The ground, to admit of such very thin sowing, had been often and almost incessantly plowed, lightened, and made clean.

in a groove cut in the ends of the swingle-trees, by which the corn stalks were more gently glided off.

Light one horse plows covered the seed wheat close to the rows of maize, without any want of handhoes: but a rake followed and levelled the ridge, here and there formed by the one horse plows lapping the opposing furrows which ought not to be lapped. For chopping round stumps, a handhoe was used. The light plows went only a bout or two, next to the maize plants: then followed the two horse plows, for covering the rest of the seed; and these left a narrow balk, which the double mould board plow split. This was pleasingly performed: the double mould board plow, dipping deep, shouldered up the earth on each side and gave square edges to the *beds*, leaving them with flat surfaces, and deep furrows as drains for receiving heavy rains as they fall and gently glide off the beds,*

My maize was planted four feet apart in the rows, with seven feet intervals between the rows; which gave *beds* of wheat, after deducting the water furrows, full $5\frac{1}{2}$ feet wide. Concerning *beds* and *water*

* The one horse plows might have performed the whole; except opening and finishing the water furrows and edging up the sides of the beds, which no plow else than the double mould board plow, could well perform: the soil a clay-loam, very level, and without stone or pebble.

ter furrows, see before, page 88. The maize so planted in squares of 4 by 7 feet, takes 28 square feet to each cluster of maize plants, commonly called hills of corn, but which in the above method of culture has no hill ; and there are 1550 of them on an acre. By a single dip of the double mould board plow and progressing along, the edges of the wheat beds are formed and finished, the water furrow is left deep and clean for receiving from the flat beds and carrying off redundant rain, and for conveying as funnels fresh nourishing air to the growing wheat in the spring, and till the grain is ripe. When shrimming wheat in autumn and spring shall be practised, the water furrows will be as paths to the horses ; which assure precision in the work.

Near the end of September or early in October, the wheat plants being up, with sharpened hoes the maize plants were chopt off close to the ground, without injuring the wheat, even although a plant of wheat was here and there cut up. Two of the people take a row between them ; and bear off the corn and stalks from the middle of the rows to the headlands : one person carries to one end and the other to the other end of the rows. There on the headlands the stalks and all were set up in conical heaps, with the buts on the ground. They remained thus, airy, in not too large heaps, till the corn was cured on the stalks ; and then the ears with husks on were separa-

separated from the stalks and carted to the fodder house, or hollow rick, made from the maize tops, which were early cut for avoiding impressions from equinoctial storms. The naked stalks were carted to the farm-yard, for litter, at leisure; the blades having been stripped off in the field, before chopping off the stalks.

In making experiments, it is well to have some variety, progressing from smaller deviations into extremes: by which the best medium is to be ascertained, and the utmost that the plants can bear is discovered. I had tried tops of maize cut off, soon as the tassels and ears had shot out, leaving here and there a tassel for perfecting their farina; and thought the grain rather better for it. I had also exposed infant plants eight to ten or twelve days, to drought and scorching sun, standing on parched narrow ridges, and then continually plowed the ground to and from the plants, even whilst they were in ears and grain filling, without any injury to the corn. Now it was determined to try the effect of plowing so close to the young maize plants as to rub the plowshare along the mass of roots, turning the earth *from* them, on both sides, and let them stand exposed to the sun and wind some days. It was in a very heavy strong piece of ground which the horses, straddling the rows, plowed thus and turned the earth *from* the plants, on both sides, so that

that the plants four or five inches high, generally tottered, and a few were plowed up. They stood so eight days in very hot, dry weather. The earth was then plowed *to* them: and from and to them, alternately just as the rest of the field, from this period. This was of four rows. When near five feet high, shewing the field to a neighbour, I asked if he perceived any difference between the first four rows (the above mentioned) and the rest of the maize in that cut, which was a small one. He paused, but concluded that if there was any difference, the four rows were rather the best. To me there appeared no difference. The whole had been plowed from and to the plants, but not so close as the four rows.

At other times I had stripped blades bolder than common: and now about 150 hills of maize were pitched on for stripping the blades and cutting off the tops at a time when the corn was not hard, but here and there might be some nearly soft enough for roasting ears. Injury was apprehended from this severity: but the value of so few hills of corn was disregarded, when it was sought to know how far the maize would bear severe treatment. Beyond expectation, no difference was observed between this and the rest of the maize.

HEMP.

The extensive usefulness of hemp, the little interference of its culture with the other work of farmers in America ; and *when water-rotted daily as it is pulled*, the ease with which it is prepared for *rope*, as well as the general certainty of the crop with a good price, led me to prefer it to other uncommon articles of crop.*

Ground, level and rather low, not wet, a mellow loam, whether of the sandy or clayey sorts, was preferred. These soils are not cold ; and when well cleaned and prepared by plowings and a due quantity of manure, are in condition to yield *many repeated crops* of hemp ; a little manure being now and then added.†

Farmers

* My hemp harvests at Wye in Maryland, were always after those of wheat, and before seeding winter grain. In England they interfere with the grain harvests. Between water-rotting, *daily as it is pulled*, and the spreading it in fields to rot, is all the difference in the world : the former is dispatched in a few days : the latter requires careful turning once or twice a week, for a number of weeks ; and then is found straggling or tangled : but with attention it is gathered up and the stems are placed in some order. In America, hemp and flax are commonly *dry* before they are spread to be dew-rotted. If spread before the last of September, they become sun-burnt, red, harsh, and dead.

† Mr. Young speaks of a piece of ground at Hoxne in Suffolk, England, which has been under crops of hemp for *seventy successive years*.

Farmers without experience, if not also without thought on the subject, say their lands will not bring hemp. Most kinds of soil will yield good crops of it, if not wet. If poor, manure them. Every husbandman can manure and cultivate land enough for giving him rich crops of hemp. The plowings for reducing ground to a mellow garden-like state should be many, preceding the *first* sowing. Every time that young weeds appear, plow them in. When the ground is thus well cleared of the seeds of weeds, then sow hemp-seed, and repeat it year after year on the same ground; giving it now and then a little manure and *two autumnal plowings*; and the like plowings with harrowings in the next spring, immediately before sowing. If to cultivate an acre thus highly should deter the farmer, let him at first try a fourth of it; which would give him more than he would want of traces, leading lines and other rope. The spinning and working it up into rope would be mere play: but, as is seen below, making as much hemp as he can for market, would yield him a good income.*

April,

* The tobacco planter thinks nothing of cultivating twenty acres in tobacco, and erecting four or five large framed houses for curing it. But he would start at a proposal that instead of tobacco he should cultivate the 20 acres in hemp, although it would require but one such house, not an eighth of the labour and attentions, and is without any of the uncertainty. It is a common mistake that hemp requires low

April,* when the ground is moist, clean and mellow, in garden-like condition from plowings and harrowings, is the time for sowing and lightly harrowing in hemp seed. The plants then soon appear, and rapidly cover and shelter the whole surface of the ground; whereby weeds are kept under, and immoderate exhalation is prevented. My hemp never suffered materially from drought but once, and that of a sowing in May, which grew rather thin. It was never found necessary to weed what was sown for a crop; but only such as was sown thin for producing seed. Sometimes seed was saved from the margin of the field, where the plants had room to branch, and were coarse: or a portion was sown thin, for giving seed: or still better, plants grew equidistant and well cultivated, for seed alone.

When the male or impregnating plants shewed maturity by some change in their colour, and by the farina or dust flying off from the blossoms, all was pulled up, both male and female: and the pulling of every day was put into a salt water cove, in the evening of the same day, promiscuously bound up in

ground or rich bottom land. Almost any land that is not absolutely wet, may be made to yield good crops.

* The middle to the end of April. If the ground is not moist when the seed is sowed the hemp is apt to come up and grow unequally.

in small bundles, and sunk $4\frac{1}{2}$ feet in the water, in a thick square bed. On the third day it was inspected; and from the third to the fifth it was enough rotted, as it is called. In examining it, with finger and thumb some of the roots were broke. If they bent or were tough, it was not enough: when they snapt off short like glass, it was enough: but the bark also was tried. The hemp was then taken out of the water, and laid sloping with the heads down to drain till morning: for it was usually taken out in the evening. In the morning it was spread, and whilst drying, once turned. In a few fair days it was dry, and then carted to an old tobacco-house, where it was bulked up till the hurry of securing the other crops was over.* It was broke and swingled in the next winter. Some of it was made into ropes for my farms: the rest sold to rope-makers, from the swingle. The rope was bright and strong, and the hemp said to be of a quality entitling it to the bounty then offered for *water-rotted* hemp.†

A

* For want of house room it may be stacked in oblong *Ricks*, topped with thatch or straw.

† It is said that both the dressing and spinning of hemp are best performed in a damp place. It is inclined to *twist* too much in spinning. Also that it is a *less injury* to the hemp to *pull the plants before they are ripe enough, than to leave them too long standing*: and it is a *less injury, in soaking hemp, to leave it too long in the water than to take it out before it is sufficiently soaked* (*live or running water is meant and spoken of*). And

A small part of one of my crops of hemp was *dew* rotted : which was sufficiently disgusting to forbid a repetition of that mode. It was a tedious while on the ground. Winds blew it about and entangled it. It rotted partially: not the whole of the same fibre alike. Here it was strong: there weak.

Where there is only a stream of water, it might be proper not to place the hemp *in* the stream; but, digging a deep oblong receptacle, let a sufficiency of the stream pass through it, when full, on one side of the natural current. There rot the hemp in clean water; which should constantly be coming into and passing through the pit, in a degree of plenty for preserving the water from corrupting or being stagnant; but not so rapidly as to fret off its bark:*

and

it is asserted, that putting the clusters containing the hemp seed in heaps, to sweat and heat, causes many seeds to ripen.

The above observations on hemp are taken from a publication in London, in 1790: in which the reader may be alarmed at the boldness of the assurance respecting hemp being long left in water: but a distinction is to be taken between water *stagnant*, where it would rot; and water running or *alive*, in which it cannot rot.

* The operation called *rotting* of hemp, ought to avoid every tendency to *rot* the plant. Water when pure and lively does not *rot*, but it *dissolves* a viscous gummy substance which had bound the fibres of the bark together and to the body of the plant. The purest water is the best *dissolvent* of such viscous

and the hemp should be secured in the receptacle, against torrents, by weights, or bars crossing the bed; and by the receptacle being sheltered behind some point or artificial barrier or fence.

After pulling the hemp, weeds grew up; which were reduced, and the ground was left in clean condition till the spring, by plowings.

H

Having

substances. I have seen hemp which had been rotted in stagnant dirty water; the appearance whereof was bad. The hemp I rotted in *clear tide-water*, had a light straw colour. I see no reason for apprehending damage to the bark or firm part of the hemp, if it remains in the *running or live water* a week after it is proved to be enough soaked for breaking and dressing. It probably would be freer from the gummy matter, and would break and hackle easier and better, without being weakened. But, let *experiment* be made! When the bed of hemp in clean *live water* is enough, let a part remain in the water a day or two longer; another part two or three days, &c. that we may see the effect of its being continued in the water till different periods after its bark is commonly enough for being stripped. The water must be *alive*, not stagnant. Experiments carried on progressively till in the extreme, have their use.

A Mr. Antil says, if hemp is put into *stagnant* water, it will be enough in four or five days: if in *running* water, in three or four days: which strongly implies the superior dissolving power of live water, and that the operation effects *solution*, not *rotteness*.

Having no minute of the quantity of seed sown, I can only recommend what seems best. But, it greatly depends on the state of the ground, and the purposes for which the crop is intended. A little experience will ascertain the proper quantity. Two bushels of seed to an acre, I believe are a full portion for rope. That quantity or a little less might be about what I sowed.* It is said in a publication by the Boston Committee of Agriculture, that in the common method of sowing by broad cast, "not less than three bushels are usually sowed, and sometimes more, according to the richness of the soil."

A design was formed by way of experiment, but not put in practice, of sowing the hemp seed on flat beds, having paths between them from whence the hemp plants might be pulled, half way across the bed, and then the other half; with intention that the male hemp should be pulled and water-rotted alone, leaving the female hemp to stand longer, which its deep green colour and thriving appearances seemed to recommend; but why should this double work be imposed, when the crop which had been *all pulled at once*, soon as the male plants shewed ripeness, proved so excellent and so unexceptionable?

The plants of one crop, which grew too thinly,
were

* My hemp seed was generally sown too thin, as I suspect; and the hemp was rather too little rotted, from over caution.

were so firmly fixed, that it was found necessary to cut them off near the ground; which left their numerous snags standing: and they were dangerous to such beasts as might any how get into the ground; and to people walking there, especially in the dark.

If the ground be good and well prepared, no crop is more certain than hemp, sowed in time, and when the soil is moist. But how uncertain is the tobacco crop! Failure of plants from frost, drought, or fly; want of seasonable weather for planting; destruction by the ground-worm, web-worm, horn-worm; butt-tening low, for want of rain; curling or frenching, from too much rain; house-burning or funkings whilst curing; frost before housed; heating in bulk or in the hogshead; inspection, culling, &c. Cultivating tobacco cleans, but exposes soil to exhalation and washing away. It is only about a month that it shelters the ground: but hemp shades it from May till about the first of August: and from early August it would be advantageously sheltered with a growth of buckwheat, till this blossoms; and then (commonly) during a temperate state of heat, it would be a *manure* if plowed in.

This *buckwheat manure* repeated every fall would I believe preserve the soil in good heart for yielding rich crops of hemp, if not suffered to go to seed, during many successive years. *Plants suffered*

to go to seed, remarkably impoverish soil. Not so of what are harvested before they are in seed. Hemp is pulled before it seeds : flax whilst in full seed. The effects on the soil are accordingly. But if the male Hemp is pulled by the beginning of August and the female not till September, the seed being then ripened, the soil is thereby greatly impoverished ; and two hemp harvests are produced instead of one : the last whereof interferes with seeding of wheat, rye, and barley.

Buckwheat must not run to *seed* on ground to be sown with hemp. I have had it spire up and contend with growing hemp, till the buckwheat has been five feet high.

The heaviest work in procuring Hemp, is the *breaking* and scutching or swingling it. But as it is the work of leisure winter, and every person who strips tobacco can break and swingle hemp : and moreover as hirelings, if necessary, are in that season easily obtained, this bugbear part of the business can assuredly be accomplished, and the hemp got rid of at market in the spring.—The *riddance of crops* is always advantageous to future operations.

A planter gaining 20 hogsheads of tobacco from 20 acres of ground, value 800 dollars, might expect 12000 or 16000lbs. of hemp from the same ground, value 1000 or 1200 dollars. But, if the income from

from the hemp should be a fourth less than from the tobacco crop, yet I would, on several accounts, prefer the hemp culture.

For the country house-wife who wishes for information, the following is inserted as what I have read of a method of *softening* and *preparing* hemp, for making it into linen. The Hemp is laid at full length in a kettle. If the kettle is too small to admit it at full length, the hemp may be doubled, but without twisting it; only the small end of every hand is twisted a little, to keep the hands whole, and from tangling. Smooth sticks are laid in the bottom of the kettle, across and across three or four layers, according to the size and depth of the kettle; which is for keeping the hemp from touching the liquor. Then pour ley of middling strength, half the strength of that for soap, gently into the kettle till it rises nearly to the tops of the sticks. The hemp is then laid in, layer crossing layer, so that the steam may pass through the whole body of the hemp. The kettle is now covered close as can be, and hung over a very gentle fire to stew or simmer, but not boil, so as to raise a good steam for 6 or 8 hours. It is then taken off, and let stand *covered* till the hemp is cool enough to be handled. It is now taken out, and wrung very *carefully*, till dry as can be: then hang it up *out of the way of the wind*, in a garret or barn with all the doors shut. Here it remains, now and then

then turning it, till perfectly dry. Then pack it up in a *close*, dry place, till it is to be used. Yet at times it is to be visited, and examined if any part has become *damp*. At leisure, *twist up* as many hands of hemp as are intended for present use, *hard* as you can ; and with a smart, round, smooth hand-beetle, on a smooth stone beat and pound each hand by itself, all over very well, turning it round till all is well bruised. Then untwist and hackle it through a coarse, and after it through a fine hackle. Hackling is performed in the same manner as if combing a fine head of hair ; beginning at the *ends* below as these are entangled, rising higher and higher : at last the top of the head is reached. The first tow makes country rope ; the second, osnaburgs, sheeting and bagging ; and the pure hemp excellent thread and linen.

FARM-YARD MANURE.

For conducting the business of a farm to full advantage, the farmer is to pursue objects which systematically embrace such a regular course of particulars as shall best follow and depend on each other, for obtaining the one whole of the design of farming. It is not immediate product alone that we aim at : for, whilst we wish to obtain repeated full crops, our reason assures us it is indispensably necessary to that end, that the soil be preserved in full vigor. The mind then is employed, principally, on the objects

jects of *preservation and improvement of the productive powers of the earth.* Observations on the state of common farming fix the opinion, that no unconnected random pursuits tend to ensure a succession of advantageous husbandry for any length of time.

Well chosen rotations of crops together with due culture, are believed to be so favourable to the ground as to need but little of manure in comparison of what the common random or ill chosen crops absolutely require. Still the steady and attentive application of *manures*, is held to be an essential duty in farming, a great link of the chain, in every instance. If rich soils require, comparatively, but a moderate quantity, in a rotation where ameliorating crops are prevalent, yet middling and poor soils want all that can be obtained; and, under the *old Maryland courses especially*, all soils eagerly demand *more manure than can be readily procured.* These exhausting courses we see continually impoverish the soil. Too many farmers therefore incline to move to fresh lands; where they would precisely act the same murderous part over again.

The principal links in good farming are due *tillage*, proper *rotations of crops*, which are treated of above, and *manures*, of which it is wished the occasion would admit of more than the few observations which follow.

" In

" In the American practice, *hay and fodder are stacked in the fields*; and the cattle are fed round the stacks and *fodder-houses*: the disadvantages whereof are,

1. A *wasteful* use of the provender;
2. The *dung lying as it is dropped* without straw, or other vegetable substance brought to it, the manure is little in quantity; and
3. That little *not lying in heaps*, is reduced abundantly by *exhalation* and *rain*; without leaving any thing to the soil.

In the English and Flemish practice (feeblely observed by a few of our husbandmen) cattle are carefully *housed*, or otherwise confined to a fold yard in which are *shelters* against cold rains, during the whole winter, and as far through the spring as food will last: the advantages of which are,

1. A fair expenditure of the provender, *without waste*:
2. *Less exhaustion* of the juices; because of the dung lying together, in *large heaps*:
3. The dung being mixed with the *straw*, and other vegetable substances brought to the beasts as *litter*, the whole is trod together, and forms a large quantity of very valuable manure.

It may be no exaggeration to affirm, that the *difference* in the quantities of manures obtained from an equal stock of cattle by those several methods, may be as three to one. If six acres may be annually manured by the inferior method, then may eighteen by the superior. Now on a supposition that *manured land is kept in heart five years* without repeating, in the one case but thirty acres will always remain in good order; in the other ninety acres: a very important difference! Indeed it is all the difference between an husbandman's poverty and his riches.”*

Do cattle, when foddered round hay-stacks and fodder-houses or ricks, give twelve loads of manure each? Do they yield *one* such load? It is a fact stated I think by Mr. Young, that in the course of a winter cattle, kept up and littered *in a yard*, have yielded full twelve such loads, each beast; and if soiled or fed well during the summer with cut green grass or clover, they may be expected to yield more and richer manure; especially when they are *kept up*, on a *full quantity of litter*. Here, by the way, it may be noted that a portion of grass only sufficient to keep one beast in *pasturing*, has sufficed five in *soiling*: and what is of immense importance to the

* The above quoted passage is from a friend, who wished to have something said of *farm yard manure*; and in very few words he has here said a great deal.

the state of the ground and of future crops, the ground being *untrod*, in soiling, is left *light* and *mellow*. Another favourable circumstance attends soiling: the beasts are kept in *shade*, and considerably protected from flies; especially when the house is kept dark during the heat of the day, with only airholes near the ground and above their heads.*

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* In towns, *wash* is given to cows; and in the country *swill* to sows, &c. *Wash* is composed of washings from dishes, and the offal of roots and cabbage from kitchens. *Swill* is meal, or rye, or buckwheat soaked in water till the grains swell, and with stirring burst; and sometimes maize is so soaked. *Swill* is said to be the most nourishing to hogs when soured by long standing. The celebrated Count Rumford says it is coming fast into use in Germany to keep horned cattle confined in stables, *all the year round*, and there feed and frequently give them a *drank*, composed of bran, grains, mashed potatoes, mashed turnips, or oat meal, rye meal, or barley meal, with a *large proportion of water* and a good quantity of *salt*: and it is discovered to be the most nourishing when given *warm*, and when the mixture has been well *boiled*. Another advantageous practice, the Count says, is to give one-third of *cut straw*, mixt with two-thirds of chopt *green clover*; with which horned cattle ruminate (chew the cud) better than with green clover alone. Coach horses are kept up in stables, many of them scarcely ever being permitted to run out on grafts. My coach horses for nine or ten years past have never been a moment at pasture, but in all that time have been kept in stables, and fed on nothing but hay and oats, and now and then a little bran and shorts or maize; observing withal to give them *salt* frequently. Their health

It will be said, the ground round the stacks receives the dung dropt, as a dressing to so much of the

and plight have constantly been good in the whole of that time. Then why need farmers suffer their beasts to tread, harden and till their soil, and waste grass and dung, by running in pastures, when they may more advantageously be kept up, housed and fed during summer with cut green *clover* and *straw*, and in winter with *fodder* and *drank*. If no beasts were ever suffered to pasture, there then scarcely would be any necessity for having cross fences—What a saving of labour and wood! But what is to be done with sheep? Give them a range of woodland and rough grounds? Why not keep them up? Mr. Bakewell practised stall-feeding them, if he did not also keep some in houses the year round. They would require airy shelters and roomy yards, in divisions, for the different conditions of sheep. In Italy are sheep-houses built of stone in rows, with divisions, a variety. Before them is a large square *inclosure*, divided into *five equal parts*. In the first division and in the stalls belonging to them, are the *eaves big with young*; in the second *sucking lambs*; in the third and fourth, the *two year old lambs*; and in the fifth are the *lambs done sucking*. Trav. through Naples, translated by Ausrere, 1789. In Flanders their sheep are *always* in stables, and are let out every day into the yard. 20 An. 466.—Mr. Cook (inventor of the drill) says that the benefits from *straw cut into chaff*, and passing through cattle, *instead of being trod under foot as litter*, are very great. He supported in winter, 40 cattle near 7 months on 30 acres of *straw*; and 4 of turnips; and made from it 400 tons of dung—10 tons of pure dung each beast—How valuable! When he wrote this he was making experiments in feeding his *horses* on *green food*, *clover*, *vetches* and *grafs cut with straw*; and expected the dung

the field. Alas! we know this extends to a very small distance, and the effect is in no part considerable.

from it will more than pay for all their keep and the expense of cutting. 28 Eng. Rev. 1796, p. 89. "It has, say the reviewers, long been used in Germany to *chop green clover*, and mix it with *chop straw*: two stone (28lb.) of clover, and one (14lb.) of straw. It is practised by those chiefly who confine horned cattle in stables, *the year round*; feeding with *these* in summer, *drank* in winter."—Sheds with large boilers are fitted to stables and cow-houses, to prepare food for horses and cattle. English farmers say they find it highly advantageous. The *dranks* being *boiled* are more nourishing and wholesome. Expense of fuel and attendance are compensated by improvement of the food. They boil potatoes two or three hours; the longer the more the food is improved. But of late *steaming* instead of boiling potatoes is preferred, for saving fuel. And now by recent improvements in the economy of fire, by Count Rumford, the expense of fire and fuel is reduced to a mere mite. They throw away the water, as it is apprehended there is something noxious to animals in *raw potatoes*, and in *potatoe-water*.—In Japan they universally feed all beasts in *houses*; in which they are kept up the year through. They seem to know nothing of pasturing.—"I took the idea of maintaining cattle in *yards or houses*, says Mr. Baker, from having frequently heard that, in *Flanders*, they scarcely ever suffer their cattle to *pasture* at large: but the farmers all feed them in *houses*. I have now pursued it three or four years; and have so much reason to be satisfied with it, that I cannot sufficiently recommend it to others." 1 An. 93.—In soiling there is sometimes a wasting of the green food, by giving *more than is eaten*; laying it in *heaps*; where it remains till it ferments

able. The place where, is some eminence: the rains and winds of half the year *wash away and evaporate* from the frozen ground most of the rich substance of the dung so dropt about; and the ground, whilst unfrozen, is *trod close and poached* to a degree that untills it nearly equal to the value of the dung left on it uninjured. This is illustrated: a fodder house (a hollow rick made of maize tops in the way of thatch) was set up in a field, as is usual: it was fenced in. At the south front maize was husked, and the husks were sheltered in the fodder house. In the course of the winter they were given out to cattle, in front of the rick. In April the fodder house being then empty was pulled down, and the covering of maize tops was given to

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and becomes sour, &c.—By foiling in a yard littered, with the food in racks and cribs, labour in cleaning and saving urine is lessened. But the value of this labour so saved is lost in the cattle thriving less, the quality of the manure, the beasts pushing and driving each other and illnaturedly preventing others from eating, whilst they are worried by flies. *Trampling dung and litter* in the winter, or much rain, gives an appearance of rottenness very fallacious. Water, is the proper ferment for dung, together with the rich material urine; but treading dung as fast as it is made, impedes fermentation. Dung made under cover (the beasts kept up) is better than made in a yard: cattle do better and the food goes further.
14 An. 160.—But is it not better that dung should be rotted not more than partially when the ground receives it, that it may ferment and rot mostly whilst in the ground?

the cattle. The ground thus *sheltered* by the fodder house for six months, October to April, shewed marks of richness greatly superior to the ground on which the cattle were foddered during the same time: grass, weeds and crops, during the four or five following years of my remaining on the farm, shewed this in their great growth. Where the fodder-house, three hundred feet long and twenty broad, stood and sheltered the ground the richness of the soil was strongly marked; when but a faint superiority over the common field appeared on the part where the cattle were foddered.

Litter is an essential, to cattle when let into *yards*, instead of being kept in houses; without which *yard manure* is of small account; and unless it be in *full proportion* to the number of cattle in the *yard*, it is not thought highly of: but is as a half done thing. Good farmers in England deem *full littering* of cattle, when *in yards*, of such importance that after reaping with sickles and inning their wheat, they *chop* the *stubble* with sithes, and stack it for litter. Besides straw and stubble for litter, they apply to the same use, fern and such other vegetable substances as they can procure: and they buy straw from common farmers who are not in the practice of littering.* In all countries, common farmers

* Mr. Bakewell kept his beasts housed without litter till of late. He prefers the dung from a given quantity of straw

farmers are indifferent to improvements : they look not beyond old habits ; and it is prudent that they venture not on extensive new projects, without first making experiment. A full littering is three loads of 12 or 1300lb of straw to each grown beast.* In England straw is sold by farmers who are tenants on short leases, who jog on as their fathers and as themselves were *trained*, and from which they cannot deviate.† It is presumed that here also straw is to be bought. *Maize stalks* will for a long while cost little else than carriage. A skeleton frame made of a light wood may be contrived to carry a vast quantity when they are dry : but whilst yet uncur-

ed

eaten by cattle, to a larger quantity gained by *littering*. On which Mr. Young observes, that his reasoning is good where stubble, fern, and the like are to be had for littering with ; but adds that a small quantity of dung very rich, is not equally efficacious with a large quantity of weak dung that contains altogether equal richness. Mr. Bakewell afterwards practised littering his cattle in their sheds. 4 E. Tour 449.

* In *England*, 1300lb. of *straw*, heaped on a waggon is a *load*. A load of *hay* is various : In some places it is an exact ton, of 2240lb. ; in others, 2200lb. ; in others again 2500 ; and about *London*, only 1800lb.

† “ I believe it is never done, except in the vicinity of “ large towns ; where it is easy to exchange straw for manure “ to a double profit. Maize stalks might undoubtedly be “ converted to excellent manure, but seem to be universally “ wasted.” S.

ed they are better, because of their sweet and nourishing juice, which invites cattle to browse on them, as they lie under foot in the yard. When they are much trodden they become of a *sponge-like consistence*, which *retains* the *dung* and the *urine* very effectually. Let us not be sparing of expense, or be dilatory in procuring the necessary materials for a *full littering*. It increases and preserves the *manure* requisite for the improvement and preservation of the powers of the soil, for enabling it to yield greater crops and more of pecuniary income, and comfort.

In America, straw, stubble, maize stalks, fern, weeds before they feed, flags, wild oats, sea grass, and leaves of trees are to be applied as litter. Our farmers say, “there is no manure in corn stalks;” and they are left standing in the fields. I have been used to draw them into my cattle-yard, in the fall and during winter; where they were laid thick, as litter to grown cattle, and were trod into a sponge-like state; in which they catch and *retain* the dung and *urine* of the cattle, so as to give a great quantity of rich manure. A farmer near Philadelphia, after inning his wheat crop, *mowed* and secured the *stubble*: the motives whereof were to preserve his young clover from being smothered by a rank stubble, and to use the stubble as *litter* to his beasts. This is the first instance I have known of *stubble* being saved in America with any view to *littering cattle*!

tle! Farmer *Rush* has thus given an important lesson, for those who are disposed to second their judgment with determined exertion!

The quantity of straw and stubble to be produced in crops is estimated at very great uncertainty beforehand, because of the various growths which crops take in different years. It may be from 50 or 60 to 90 or 100lb of straw alone, for each bushel of wheat produced. In the Museum Rusticum, and in the 8vo volume of select papers from it, are accurate details of a crop of wheat, with its proportions of straw and chaff to that of the wheat.

In November all the cattle are to be *confined* from wandering about the fields. The cattle-yard is then well littered; and as often as the litter is trod into the dung and muck, or is soaking wet, more litter is added; so that the beasts may lye always *clean* and *dry*. They are thus confined to a yard and littered till there is a full bite of grass in May. All the cattle ought to be under shelter from cold rains during that time. Litter is to be given them, as above. But it is still better to keep stock altogether in houses; that they may there *eat all the straw*, and not be suffered to tread any of it into muck.

It is the most advantageous to a farm, and the most profitable to the farmer to have as numerous

a stock of *cattle* as can be kept well, and no more than can be so kept. Instead of cultivating grain for the market, let it with its straw be raised as food to live stock, for the market, especially whilst wheat crops are reduced, as at present, by the Hessian fly, and until our soil is restored to good heart by the live stock. The straw of grain crops will keep cattle, and the grain in meal with straw or maize fodder will fatten them. See p. 68. Yet I should not be fond of cultivating grain to be given to live stock, if it were not for the necessity of having straw for them; and straw is a very good and very cheap food, when duly prepared and applied. It is better to have too few cattle than too many: yet in some parts of America, farmers exceedingly disportion their cattle to their provender. They will have numbers of hidebound creatures, many whereof die from mere want of food and shelter: so that less meat and less manure are derived from a great number so poorly kept, than better farmers have from a due proportion well kept. Besides, does not the man feel shame in the cruelty of starving or keeping in a state of want and misery a fellow-creature committed to his care? Is it not a trust to the creature man, from the Father of all creatures?

The live-stock ought to be as many as can be kept sheltered from cold rains, with abundant winter and summer food. Of all the kinds, the horse is the most costly

costly and the most injurious to the farm. He bites close, is almost continually treading and poaching the ground ; and eats more than the ox as 5 to 3 ; yet is not himself eatable : when he dies he is lost for ever. The *ox* is meat : after having given us his labour, he becomes food to us. *Steers* are unprofitable : they cost five or six years keeping, without yielding labour ; and are then sold for less than the cost of keeping and fattening them. *Cows* give milk, and *oxen* give labour.* Sheep are profitable.

I 2

Sows

* Cows and oxen may be fattened and disposed of when 7 or 8 years old. If 6 are to be disposed of, then the stock is to consist of 6 calves, 6 of two years, 6 of 3 years, 6 of 4, 6 of 5, 6 of 6, 6 of 7, and 6 of 8 years ; in all forty-eight head ; whereof thirty give milk, labour, or meat. After marking six calves, yearly, the very best for cows and oxen, the rest are to be sold : so that not a steer is to be raised, other than shall be necessary for oxen. An ox *improves* in value, ten dollars a year from the time that he comes to be used and fed as an ox. A horse *declines*, till he comes to nothing. "Mr. Cooper was much prejudiced against oxen ; but is now such a convert as to have parted with most of his horses. A horse costs as much as $4\frac{1}{2}$ oxen : and the ox's keep is in summer, *grass* alone ; in winter, *straw* : on which they may be worked moderately. If hard worked, they have hay. In *harness*, they are still more valuable. Their harness is much the same as for horses ; except that the collars, open, are buckled on and worn contrary to those for horses : the narrow end of the collars, which open, being downwards ;—and as the chains are fastened to them in the same direction as in horse-harness, the beasts of course draw much higher than horses. The line of the chains is almost up to their

Sows and *pigs* ought to be especially kept where there is a dairy, as they make a considerable part of its profit, from the offal milk. *Hogs* are advantageously kept on green *clover*; and fattened on *potatoes* with meal of maize.

Quantity

backs; but much above the chest: which is necessary from the different shape of horses and oxen. They draw, when *in harness*, *abreast* in pairs; *single*; or *in a line* one before another; and walk as fast as horses. An *ox-team* five in a waggon, and a *horse-team*, four in another waggon. Both went twice a week, fourteen miles out, and fourteen miles home each day: the load equal, about two tuns. The oxen were generally at home two hours before the horses; and were in harness. Driving with *gentleness* and good *temper*, without ever *turrying*, is found necessary to procure their *exertions*. A person who drew with *oxen*, two or three years, and made fair experiments comparing them with horses says, an *ox* value thirty dollars, is equally strong in the draught, with a horse value ninety dollars, and equally fit for plow, cart or harrow; and that the *ox* requires a fourth part less provender than the horse: also that the *ox* *works* and *increases*, from four till he is ten years old; but that seven hours work a day is to him as much as eight to a *horse*.² See E. Tour, vol. i. p. 172—vol. iii. 152—vol. iv. 5. 82. 269—vol. iii. 398. 418—vol. iv. 268. 273. An. vol. xxiii. 68. 70. *Oxen* may every way be used instead of horses: *bridled and rid*; *harnessed and driven* in waggons, plows, &c. In Maryland one Sutton Sicklemore rode on a bull about the country; and I have seen a woman going to a race, with her chest of cakes and sitting in a truck drawn by a bull *bridled* and guided by herself. In Pennsylvania, I saw a waggon drawn by two bulls and two oxen, *bridled and geered in harness and collars*.

Quantity of land, alone, is no rule for fixing on the number of cattle to be kept. Not only the quantity and quality, but also the situation and the crops will affect the question: and the attentive farmer will determine from his experience, how far he is to enlarge or reduce the numbers and kinds of his live-stock.

“ In many situations, says Mr. Young, the dependence of a farm for manure, is on the straw-yard. If in that case the farmer does not properly proportion his arable crops which feed cattle, to those which litter the yard, and both these to the quantity of his grass fields, the farm will be long before it gets well manured.”*

How advantageous for acquiring *dung*, so essential for preserving the productive powers of the earth, is the practice of keeping cattle *up in yards*, well littered—How much more so the keeping them *up in houses*, littered the year through!—especially, when they are fed with green food cut for them in *summer*, and juicy roots and drank with their dry food, in *winter*: but cattle may be advantageously *kept* without having any *litter*, provided they are in stalls in houses, tied up, and their floor daily cleaned; as Mr. Bakewell a long while kept his.

BARNs.

* Better to depend on the *stall and house*; where *litter* may be dispensed with, and stock increased.

B A R N S.

Farmers in Pennsylvania have a commendable spirit for building good barns, which are mostly of stone. On the ground floor are stalls in which their horses and oxen are fed with hay, cut-straw, and rye-meal; but not always their other beasts.* Roots are seldom given to their live-stock, being too little thought of. The second floor with the roof, contains their sheaves of grain, which are thrashed on this floor. A part of their hay is also here stored. Loaded carts and waggons are driven in, on this second floor; with which the surface of the earth is there level; or else a bridge is built up to it, for supplying the want of height in the bank, the wall of one end of the house being built close to the bank of a hill cut down. For giving room to turn waggons within the house, it is built thirty-six to forty feet wide: and the length is given that may be requisite to the design or size of the farm. But if

* "Barley, says Sonnini, is the common food of horses in Egypt, as it is in all parts of the East, where rye and oats are unknown. However prejudiced our farmers (in France) may be against barley as a food for horses, they cannot avoid being convinced of its excellence in this respect, when they consider that in the countries where these animals are most eminent for their goodness and beauty, they eat no other kind of corn."

if the waggon is driven directly into the barn, it may be as directly drawn back without turning it—a great saving of room; and the house need not be so wide as for the sake of turning waggons in it. If waggons carry more to the barn at a time, yet carts are brisker: their loads are shot down in an instant, and they turn short. Waggons are tediously unloaded.

I have seen a barn, in Chester county, Pennsylvania, which had a cellar under a floor of planks on joists, on which horses and oxen stood; and their dung was daily shovelled into the cellar. The farmer said this dung is the better for being thus kept *dry*: but, may it not be there *too dry*? Dung drowned with water must be much injured. But if a deep mass of dung receives no more water than what falls on its surface from the clouds, and is well sheltered from the sun, is it then injured? Is it better or worse for being rotten before it is applied to the ground as a manure? If first rotted, it will spread and mix with the soil more perfectly. If but partly rotted, and then spread and plowed into the ground, instantly as it is carted out, will it not be stronger—more powerful in opening and enriching the soil? It there finishes its heat and fermentation, which precede and bring forward rottenness, whilst it is in the ground.*

There

* The 4 E. Tour, 452. speaks of dung being put up in a small compass, or compact mass, that the *sun, wind and rain,*

There are not many instances of sheds tacked to their modern barns. Their mode of building, of late, does not well admit of them ; and room is gained by all being under one roof, covering one or more stories, having deep sides or pitch. The roof is a costly part of buildings : but it costs no more to cover three or four stories than one.

Their barns on the sides of hills (which they chiefly prefer) may be built three stories high, instead of the usual two stories. Cut down the hill perpendicularly seven or eight feet, and build up one end of the barn close to the bank. The other walls are to be quite free and *airy* from bottom to top. The ground story seven or eight feet high ; the next thirteen

may have but little power over it, to do it mischief. Of these, the *sun* exhales without its rays adding any known virtue to the dung ; and the *rain* when in excess, would rob it by too great dilution and washing away its substance : but the atmospheric air might impart to it some of its rich combinations. For making gunpowder, nitre is collected in beds of straw, earth and rubbish, raised in thin banks or walls above the ground, exposed to the air ; and sheltered only from *sun* and *rain*. From such *thin masses*, rains would wash out the nutritive stores, and the sun would exhale them. But, would what my stercories receive of rain, soaked into a *large deep mass* of dung, injure the dung, when there is scarcely more than with the urine may be requisite for producing a fermentation in the dung and litter ? If *dry dung* is applied to a *dry soil*, it cannot ferment till a sufficiency of rain falls on it.

teen feet—the third also thirteen feet ; into which grain in the straw is pitched up, and there thrashed out. If the bank is not so high as the second floor, or if there is no bank, lay a bridge up to that floor. The width of the barn being thirty-six feet clear, a passage in the middle, eleven or twelve feet wide, will leave a range of cattle-stands on each side of it. The cattle are fed from the passage ; and there straw is cut and meal stored. The doors are one to every two stalls or four beasts. They may be latticed, or otherwise airy : and at the end of the passage next the bank, may be a door opening into a vault excavated from the bank, for keeping roots. The dung may be thrown into a stercory ten feet from the doors. There will be no occasion for carts passing between the range of doors and the dung pit or stercory. All is carted and stored on the barn floor, after passing in at the end door of the second floor. The stercory may be covered with whatever may shelter the dung from the sun, although it should suffer rains to pass through the covering : but no other rain or water is to have access to the dung ; yet urine is to be saved and thrown on it. One end of the stercory or pit may be open, where a hill will admit of letting carts in. Air is admitted into the barn through long loopholes in the walls, rather than windows. A good thunder rod, half an inch diameter, insures the barn against injury from lightning at the cost of less than fifty cents a year.

A stone barn, lately built in Philadelphia county, has its ground story $10\frac{1}{2}$ feet high ; the next 19 feet, and the third 14 feet. Waggons are driven into the second story. Seven feet are high enough for horned cattle. Horses require more height ; and there are inconveniences in keeping horses and horned cattle in the same house. The construction of their respective houses should be adapted to their several purposes.

A foreigner asks, if steam from the perspiration and breath of the cattle, close housed, would not taint the hay and straw on the floor above them ; and if the house being built up against the bank would not occasion an injurious dampness to the grain, the straw and the hay ? I have heard no complaint of either, and presume there is no cause for any in a country of so dry an air ; especially as these stone barns, built against banks, stored with cattle on the ground-floor, and containing grain, straw, and hay, on the upper-floor, continue to be preferred.

It is said that cattle are kept very *close* and *warm* in their houses in *Brabant* and parts of *Germany*. I never knew of out-cattle suffering materially by mere cold, unattended with *rain*, *wet snow* or *sleet*. But as often as they experience these, their wretchedness claims compassion : and the owner, feeling for himself

himself as well as for the beasts committed to his care, at some time or other may resolutely practise giving them due *shelter* and *attention*; and thereby profit of the increase of *milk*, of *labour*, of *meat*, and of *dung*, if not also of self satisfaction on seeing them through his provident industry in *comfortable good plight*, in no want.

Whatever the number of floors or stories are, the bank is not to be higher than to the second floor, which is immediately above the cattle floor: so that the bank is never more than seven or eight feet high; and to that height at the most, one end of the barn is attached to the bank. In Chester county, I have seen where a bank was cut down three or four feet, and a bridge for waggons was from the top of it four or five feet more, to the second floor of the barn. See Plate II.

CATTLE-STALLS.

On this particular is here given what I have collected of Mr. Bakewell's method of housing his cattle, from the Annals of Agriculture, or from John Burnet who was sent to America by Mr. Bakewell with cattle, a few years since.

Mr. Bakewell keeps his cattle in houses: in which a passage is at the heads of them, to feed from. The troughs out of which they eat their hay or turnips

turnips (I presume also their straw, for he feeds largely with straw) are $2\frac{1}{2}$ feet wide at top, and slope to the bottom which is of brick, three feet long, eight or nine inches deep. The bottom of brick is on the ground. No rack. Every stall is six feet wide for two cows: eight for two bulls. In each corner of the stalls is a smooth post, with a ring larger than the post for sliding up and down. A chain, not a foot long, connects with the ring, and also with a chain collar round the beast's neck, which locks with a T. The cattle can but just reach their food next to the division between the two beasts. Three feet for each cow are better than more room: in which they lye down. More space would admit of their dirtying each other. Their standing is six feet: and behind is a step five or six inches down to where the dung falls. The house is cleaned once a day; and the cattle are driven twice to water. He has forty-five in one place so tied up: and they are fed and taken care of by a man and a boy.

Cows in milk are ~~not~~ to want water. In the American climate they ought to be watered three times a day in summer. Their water ought to be near. Driving cows any distance is very injurious to their milk. In England, dairy cows are said to give from 200 to 400lb of butter. Do the American give 100 to 200? Many attentions are requisite
for

for obtaining much butter, or good butter—and also much and good milk.

In plate III. is a sketch of Mr. Bakewell's stalls ; which are without racks ; the manger is therefore the wider : also a sketch of a stall drawn by a gentleman lately from Yorkshire ; which has a rack leaning with its back part in the feeding passage ; a trough for food ; a space for the cattle to stand in ; a sink for receiving their dung ; and a way behind the cattle. Lord Holderness's sink to his cattle house is said to be without any drain ; so that the dung, urine, and refuse scraps of hay are all mixed there, and barrowed away from it, together, to the dunghill ; which seems a good practice, at least where servants cannot be depended on for saving the urine separately, and then carrying it to the dunghill.

Cattle Pastured and Soiled in Summer : Kept and Fatten'd in Winter :

In some of my little essays, are intimations of methods for keeping and feeding live-stock, very different from the usual practices of husbandmen ; but being concise or in notes, they are too obscure to be attended to. The subject claims attention, from farmers accustomed to think with a desire to improve. Such particulars thereon as at present occur, are therefore presented to the consideration of this class of husbandmen.

As well grain as grass farms maintain live-stock : but their kinds, size and number proportionate to the means of subsistence are not sufficiently attended to ; nor are the modes of keeping them, and saving their manure. They are commonly raised on the farm : but, sometimes are bought full grown, of drovers ; and grazed in pastures.

The common farmer's live-stock runs on a sort of pasture during six or seven months. In the rest of the year they are kept entirely on *dry* food, at least in Maryland. Who among our farmers ever think of procuring a *juicy* winter food, for tempering the cōstive effects of dry straw and maize fodder eaten by their cattle ? *Juicy* food in general tends to keep their bodies open, their skins and muscles mellow, pliant and easy for their better thriving. Hence the fine effect of root and turnip-feeding, so highly valued by European farmers.

It is said, cows require in England, from one to two acres of pasture : but the medium of a number of instances is found to be one and a third acre. Their pastures are *made* by sowing grass seeds after the ground has been a number of years producing crops ameliorating as well as exhausting, under *manurings* and *good tillage*. They continue many years afterwards in grass, carefully cleared of brambles and strong weeds. During the ten or twenty years of their

their being pastured, the cattle drop their dung, scattered and left exposed on the ground to exhaustion by sun and wind. If the soil obtains any good from it, yet the continual treading (wheat soil) by the beasts pastured, reduces it in deadening and untilling the soil. Nevertheless, in so long lying unimpoverished by renewed corn crops, the ground may be partly restored from constant though slow *deposits from the atmosphere*, rather than from the dung dropt.

Have our *American* lay-fields equal advantages? Very frequent returns of *corn crops* of different sorts have robbed the ground, generally *without any application of manure*: the ground is then left to a spontaneous growth of weeds and a sour or poor grass, which give what farmers of ease and pleasure contentedly deem good enough pasture. On this their ill fated horses, cows, oxen, and sheep are promiscuously turned early in the season before there is a bite: but they nibble off the scanty growth of rubbish as it rises. Here they continue till winter: sometimes through the winter; so that the ground becomes poached and trod to a dead closeness. The dung dropt is but of one or two years, towards restoring the soil, when *corn crops* are renewed, and reduce it still lower. The acquisition from detached scraps of exposed dung and from the slow effect of the atmosphere, in that short time, is trifling: far

short

short of repairing the waste, from poaching and quick returns of corn crops.*

Opposed to our unmade pastures, are the *made* pastures of Europe and some parts of America: and opposed to *all pasturing*, is *soiling*. Soiling is common in Flanders, and is advancing into extensive use in Germany and in England. It is to the present purpose that these practices and their effects be compared.

Advantages in *pasturing* are that rich grass pasture keeps grown cattle at the rate of one acre to a beast; during the six or seven warmer months: *common* pasture, at the rate of two acres to a beast. Attendance on them in pasture is very little. They range at pleasure and drop their manure on the field, so that labour in heaping, carting out and spreading it is saved. The disadvantages are, the grass and the ground are trod and reduced in value: the pastures require costly division fences: the dung is scattered on the ground, exposed to exhalation and waste by sun and wind, so as to be nearly worthless: the horses

* Witlings may fancy they see a palpable contradiction between quick returns of corn crops as here mentioned, so greatly impoverishing and as they are recommended in the rotations. But, their genius forbids them to see the difference between *good culture with manures and intervening ameliorating or mild crops*, and *bad culture without manures or ameliorating crops*.

horses and oxen are driven to the stable with much waste of time, and some vexation and consequent abuse.

The advantages of *soiling* are that the ground requires but few or no division fences: grown cattle are kept at the rate of a fourth part of an acre to a beast, during the six warmer months; their manure is all well preserved, and given to the soil when and where it is most wanted, and in the best condition: the soil is untrod and left mellow and lively: the horses, oxen, and cows are always up,* ready for use without loss of time: they are kept cool, shaded and less worried by flies: they acquire good coats and full flesh, on a less expense of food. When it is objected to the laying aside division fences, that there would be, at times, bad seasons when grass could not be cut and carried in, because of great rains, or of cold drying winds which check the growth of grass, so that it would be requisite there should be

K

some

* Except that for a few hours, after they are returned to the stalls on the morning watering, being then well emptied, they may be let out to strole and rub themselves in the farm-yard; from 11 o'clock till 3, then put up in the stalls; by which they will not have time to drop much dung in the yard: and what is there dropt should be barrowed to the stercory. Carried *immediately* to the stalls, after being watered, they dung and stale plentifully in the stalls: then being turned out they do not dung much whilst in the yard. Rubbing posts may be provided.

some fields divided off for the beasts to run on at those times, the answer is that there is another way of providing for the cattle, and that much better than by pasturing them. In towns we see horses and cattle are kept up on *hay* and *straw* the year round, and that it agrees with them. A quantity of hay is therefore to be kept in store, as a *provision against such untoward seasons* as shall deprive the beasts of their mess of cut grass ; and they may be *tethered*, as Mr. Boys tethers his fine horses. See the note page 154. Prudent farmers deem it *requisite* always to have some stock of old hay.*

A

* Besides, as Mr. Duplaine advises, maize is to be sown thick, 3 to $3\frac{1}{2}$ bushels an acre, harrowing the ground even, when the tassels shoot, mow and cure it into fodder. Or *cut it daily and give it green* to cattle. 9 Mus. 253. And in *soiling* or stall feeding during summer, on *clover cut green*, for supplying the deficiency of clover during dry bad seasons, besides feeding with *hay* and *tethering*, we may have made other provision by sowing *maize* broad-cast and thick on manured or rich ground in April, in May and in June, and cut and feed with it occasionally as a green fodder : the remaining maize not so used may be cut and cured into dry fodder. The Italians practise such thick sowing and feeding off the green maize ; and sometimes the blades are stripped and given green to cattle, from the maize growing to produce a crop of corn. If the maize be sown in drills 14 inches apart, and the corn about 5 inches distant in the drills, a share of 10 or 11 inches blade, would clean and cultivate the maize well, drawn by one horse. Moreover, *buckwheat* is to be sown, and the herbage given as a grafts ; and it is said to admit of being cut twice.

A farmer *pastures* his stock: his neighbour foils him. Each has 32 head of grown horses, oxen, and cows.

<i>Pastured</i> 32, at 2 a. of common pasture each, - - - - -	64 acr.
<i>Soiled</i> 32, at an acre of cut grafts to 4 beasts - - - - -	8

gained 56 a. by *soiling*; which will keep 224 cattle: or give 140 tons of hay, worth 1400 dollars.

Accounts given of cattle soiled in England, make the beasts soiled to be 4 to 6 head from an acre of cut clover. Mr. *Wynn Baker*, who was an accurate experimenter, found an acre kept five head, the grass partly cut from head-lands.* A farmer in England soiled 20 horses and 7 cows, from 7 acres of clover, without giving any corn or hay. He closely watched the management of his tenant with the same number of stock pastured in a field; and it proved that one acre mown went as far as six pastured. When his beasts had eaten 5 acres, the tenant's had consumed 30 acres, and his horses were in inferior condition.

When soiling is recommended, farmers having inveterate habits, or who are driving after pleasures,

K₂ equally

* See the note * page 122.

equally check all that might be said, by vehemently objecting to the *labour and expense* of cutting, carting and giving the grafts to the beasts ; and the farmer of *lounging habits*, ever seeking for *short cuts* and even for *nothing to do*, can never find time for cleaning stalls and saving and carrying out dung, essential as they are.*

A man and a boy perform all the work and attendance in soiling 40 to 50 beasts. They cut grafts, enough in the morning for the evening feed ; let it lay to deaden a little, and cart it in, in the evening. So the morning feed is cut in the evening to be carried in, in the morning. Supposing all the work performed in 3 hours of the morning, and 3 of the evening, there then remains 6 hours for other work. The expense of the man and boy is therefore but one half chargeable to the soiling account : but even let them be 8 hours employed in soiling, or two-thirds the expense.

Reckoning

* He is a bad farmer who seeks for nothing to do. A good farmer knows how to accomplish the ordinary round of work, and it is without grudging full labour for having it complete. The short cut which would do it but somehow, and not perfectly, he spurns at. When all this is done, with pleasure, he seeks to improve the estate : whilst others seek pleasure *abroad*, and all goes to ruin at *home*.

	Dols.
Reckoning on only 32 head, they give per year 320 loads of rich manure	300
Time daily saved in catching the beasts; foil left untrod and lively; gentleness and doc- ility of the beasts, value	40
Wages and expenses, a man and boy, a year 200, off $\frac{1}{3}$	140
Gain, in foiling, . . . 56 acres, or 140 tons of hay, value	1400
	<hr/>
	1740
	140
	<hr/>
Net gain	1600

Will you spurn at the offer of 1600 dollars that you may avoid paying wages and expenses of a man or two? These herdsmen would be requisite for *winter* feeding, cleaning stalls and saving *manure*, even if the beasts were pastured in summer instead of being foiled. How little then is chargeable to the foiling!

It is in this case unwise to suffer the mind to be biased by apprehensions of expenses which evidently must be greatly below the benefit acquired. Let us make trials of this new method of managing cattle: suppose at first our horses and oxen so kept. How docile, how well fleshed, what healthy coats, and what a valuable quantity of manure of the richest and most perfect kind on the spot!

Many

Many horses are kept up, in towns, the year through; except only whilst they are employed: and all cattle thrive better, on less food, when tied up than when at large in fields. Even sheep are so kept. The celebrated Mr. Bakewell, lately deceased, tied up his favorites, at least during winter: I believe too his choicest rams were tied up the year through, except for the moment of giving them the ewes, to run together in a lot, for they were not to be seen out at other times. In keeping *sheep* up, they ought to have room, and much fresh air in separate apartments, according to their ages and sexes, allowing to ewes with lamb a great portion of room.*

Fancy induces a pretty current supposition that all animals require some considerable range and change of place; which indeed, as far as for the seeking food, dispersed as it is in their wild state, is true. The exercise of their legs and their wings is so far especially necessary to them, as well as for avoiding their enemies. But, experience proves that they exist in perfect health and good plight when closely confined, in no want of food, as long for aught that is known as if they had continued at large in their wild state. Cattle, horses, and hogs prove this in many countries: and the horse, like the deer,

* Of housing and soiling sheep, see page 65.

deer, is of a very active, wild, and roving nature. Sheep are especially imagined to require such shifting of place: which may have arisen from the very early and general practice of letting them pasture at large. They are in flocks commonly too numerous to be conveniently housed, and being hardy are not thought to require it. But above all the habit, continued down from the first of time, of people called shepherds strolling after flocks of them, for the sake of scattered spontaneous food, is the principal support of the supposition. On the other hand, it is proved by the practices of the husbandmen of Flanders and other countries, that sheep thrive well when kept up in houses the year through: even the heath fowl, so wild and roving as they are, have been domesticated, under a degree of confinement very opposite to their habits in their wild state. A gentleman of Scotland, and his lady, of high consideration, inform me, that they have seen the black cock of that country, in the tame state in a yard. A Mr. Lewis Duval, formerly of Hawling's a branch of Patuxent river, Maryland, assured me that he had *grouse* quite tame in his yard, and that they raised young ones. Their manner of courtship as related by him was singular. The male was long in making his advances and coaxing the hen, in vain till he suddenly turned on his back, shrieked, and quivered his wings as if in a fit of agony.

agony. She then came up to him, walked round and looked on him with seeming compassion.

Without knowing the quantity of cut grass that beasts may *daily* require, 75lb are assumed; which quantity would cure into 17lb of hay: but it may be that less of green grass would cloy them than what might when cured into a feed of hay.

It is said, 28lb of green clover cut small and mixed with 14lb of straw cut into chaff equal to 17lb of hay are a feed for a day to one beast; equal to 75lb of green clover alone: what a saving of clover! But in the season of soiling, clover is plentier than straw; and straw is an essential in winter: so that 8lb or less of straw and 40 of clover may be better. When $4\frac{1}{2}$ lb of green clover cures into one of hay, 28lb are equal to $6\frac{1}{4}$ lb of hay: to which add 14lb of straw; the whole is equal to $20\frac{1}{4}$ of dry food. But the straw is inferior to the same quantity of hay; and 17lb of hay is a good allowance to full grown beasts per day. As much straw cut and mixt with green clover as will but improve the cud, is sufficient; and it seems 8lb of straw to 40 of green clover will answer, or even less: for clover alone answers for the purpose of rumination, though not so well as when aided by straw or hay.

A Table of Food for a Day, in Soiling Grown Cattle.

Beasts.	Clover alone.	Clover & straw.
1	lb 75	{ C.40 S. 8
10	750	{ 400 80
20	1500	{ 800 160
30	2250	{ 1200 240
40	3000	{ 1600 320
50	3750	{ 2000 400

The herdsmen ought to know how much clover and straw to cut and give daily; that there may be enough without waste. If not enough the beasts suffer: if too much of green clover or grass is cut and brought in, lying in

a heap it ferments, turns sour and is lost. Till herdsmen are well practised, it may be well that they measure each mess, and chalk down how much a basket and cart body hold of the articles, in weight. The practice will at least have a desirable tendency of leading servants to observe *method*; the value whereof is considerable in all business. Without *method*, random flights predominate and divert employment from its best objects to unimportant or wasteful purposes.

On the supposition that 75lb. of green clover, alone, suffices, in the morning are carried to the 32 beasts, 1200lb. in the evening the like quantity.

Eight

Eight acres, cut four times* in the season of soiling, is about once in every six weeks: or near 30 perches are cut in *a day*: that is 15 in the morning, 15 in the evening; or a square of near four perches each time. Would it require six hours to cut, cart in and give to the beasts a square of eight perches of grass, besides cleaning the stalls and heaping or depositing the dung?

But, in many parts of America are idle improvident people, masters of farms, who spend their time in taverns or other places of wasteful amusement: any where rather than at *home*. These haunts are at the expense of their *domestic* and true happiness. Sooner or later they bring on them debts, wants and grating claims of creditors. Such *a people* can never be brought to soil cattle, or at all improve their farms. Where is solid comfort to be found if not at *home*? The meanness, the selfishness and the folly of these *husbands, fathers or masters*, are conspicuous, degrading and shameful; who, regardless of *wife, child and dependents* claiming their protection,

* In some years this might be accomplished. In other years the cuttings would be not more than *thrice*; or even in years of very severe droughts might be not more than *twice*. In cases of necessity the horses and cattle can be tethered awhile; and hay must be reserved to supply such deficiencies of grass. Mr. Boys, (20th Annal) stakes his fine team horses, all summer on clover.

tion, their affections and their attentions, and even regardless of the true interests of their precious selves, fly from their own happiness in the moment when they mount their horses and hurry to the tavern, the race, nine-pins, billiards, excess upon excess of toddy, and the most nonsensical and idle chat, accompanied with exclamations and roarings, brutal and foreign to common sense and manners as the mind of wisdom can conceive of depraved man. Had these men, so deficient in character, been trained but a few years among the orderly, thoughtful good farmers of some neighbouring district, they would have learnt valuable lessons for conducting their *farms*, themselves and their *domestic affairs*, greatly to their comfort and advantage, and to the comfort due to their families and dependents; to whom they owe more than they are accustomed to feel for them. There are on the other hand, those who with industry aim at providing for their families, but it is not with an honest mind and fairness of reputation. The strength of these is in low *cunning*: If indeed they wish to be perfect in that detestable of all qualities, they need not go far from home; unless for the sake of embellishing the satanical talent with some variety. They might then associate with the villainous class of people distinguished for more of this base quality than of provident industry, fairness and honest, manly candour.

The

The soil of the states south of Pennsylvania, has been impoverished by the staple articles of produce tobacco and maize. Maize being cultivated in large fields for feeding supernumerary negroes, and also for the market without ever being manured, is the chief exhauster. Tobacco ground in detached parcels is manured, and so far is helped: but hand-hoe scratchings and scrapings expose the soil to be hurried off by every gust of wind or rain, and its nutritive contents to exhalation by the sun and wind. Another great evil attending tobacco-making is the *attentions* to it which are unceasing and unrivalled, so that the due culture of all other articles of husbandry is lost in that of tobacco. Houses are ungrudged for curing tobacco, two to eight or ten houses are cheerfully built for this crop; but not one for *live-stock*, nor a blade of *hay* for them, though multiplied beyond the present means of keeping them on the pretence that the more the cattle the more the dung for the tobacco: but the tobacco planters herein deceive themselves; for, their cattle being pinched in quantity and quality of food, give a small portion of but lean dung; and becoming hide-bound and exposed to fleet and cold rains, die in great numbers, yearly. For renewing the redundancy all calves are reared—But enough of these gloomy and barbarous practices!

Humanity ought, and self interest well understood, at some time or other, will induce the erecting *houses for cattle*. . The like motives ought to make *meadows*, provide *great quantities of good food*, and proportion the cattle to the means of keeping them so as to have as many, and no more than as many as can be comfortably kept in good heart. *Numbers of cattle well kept*, give the *dung* requisite for improving and preserving the productive powers of the ground.

Some account is already given of the houses and method of keeping cattle in stalls, by Mr. Bakewell and farmers in Pennsylvania.

The great difference, besides, in the American and the European modes of winter keeping live-stock, is in the Europeans giving with *dry food, roots or juicy food*; which the Americans generally neglect, whereby their cattle become costive and hide-bound. The English give *turnips*, the Germans *drank*.

Mr. Young gives an account of an *ox-house*, which in England is reckoned very complete. The owner, a Mr. Moody, keeps 26 beasts, each in a stall 8 feet wide for large oxen, 6 feet for smaller. How different from Mr. Bakewell's of the same country; which are stalls 6 feet for *two cows*, 8 feet for *two bulls*.

bulls.* Mr. Moody's has at the head of each stall, a square manger, for hay put in through a window in the wall opposite to the beast's head. The haystacks are in a yard at the back of the building; so that the feed of hay is taken from the stack, and at one step put into the manger. On one side the hay is a small stone cistern, as a trough to eat oil-cake out of. On the other side is another stone cistern for water; which is thus supplied: outside the house is a pump which raises the water into a cistern, exactly on a level with all those that receive water for the oxen. A pipe of lead leads from this pump cistern to all the others in the house; so that it may be seen by the height of water in the pump cistern, how high it is in all the rest. The house is shut quite up. In the doors are holes to let in air: but sliding shutters exclude it at pleasure. At one end of the house is a small room for oil-cakes, and a stove with a broad iron top, for laying on the cakes to be heated a little for breaking. A block stands by it, on which the cakes are broken.

Mr. Moody is singular in the practice of sweating cattle, for promoting their fattening. He says, the hotter they are kept the better they will fatten.

He

* Mr. Bakewell *kept* beasts: Mr. Moody *fattened* them. Does this occasion the difference; or is it not an error, in applying 8 and 6 feet stalls to *single* beasts?

He shuts them up, and for some time lets in no air through the holes of the doors. The breath of so many and the heat of their bodies, soon bring them to sweat prodigiously ; and when this is at its height, they fatten best and quickest. After sweating two weeks, the hair all comes off and a fresh coat comes, like that in the spring : after which they sweat no more. He adds, those beasts which do not sweat at all scarcely ever fatten well. His beasts are a large sort, from 80 to 130 stone.* He gives to those of 100 stone, two oil-cakes a day for two months : then three, till fat : also 20lb. of hay each a day ; of which they eat only the prime part. Lean beasts are kept on their offal hay. Such a beast in winter fattening eats above 30 dollars worth ; but he improves in value more than to that amount.

There is a great difference between *keeping* and *fattening*. Mr. Bakewell *keeps* : Mr. Moody *fattens* : and there is much difference in the expense of *summer fattening on grass*, and *fattening on winter food*.

In America, we *keep* cattle through the winters, on straw, maize fodder, and husks, giving them water ;

* 1100 to 1800lb ; or 280 to 450lb a quarter : or is it meant a stone of less weight by the custom of the place ? Such deviations supported by local customs are perplexing.

ter; and *fatten* on hay, and cut straw with meal; or as in Maryland, with maize fodder and broken ears of maize, in the *winter*: on grass in *summer*. It is requisite that they have *salt* very frequently; especially when tied up: and it is a good way when made up with fine clay into a firm mass, to be licked at pleasure, as in the wild state beasts *lick* earth, in spots, for obtaining salt.

Oil cake is said to be a great fattener, and on experiment has been proved to give *doubly rich dung*; but becoming dear, *linseed* jelly is taking place of it in England. This jelly is a valuable discovery; and ought to be applied in America, for fattening cattle, if not also sheep.* Hay, meal, and linseed jelly with drank, must be excellent food in stall-fattening. Linseed jelly is thus made: 7 of water to 1 of flaxseed steeped in a part of the water 48 hours: then add the remaining water cold, and boil gently 2 hours, stirring constantly to prevent burning. It is cooled in tubs, and given mixed with any meal, bran and cut chaff. Each bullock (large) has two quarts of *jelly* a day: equal to a little more than *one quart of seed in four days*. Cattle

six

* *Sesamum Oil*, by the negroes in Carolina called *Benni oil*, is said to fatten *horses* near the Nile, in latitude 14° north. Browne's Travels. This plant gives the greatest portion of oil; and may answer instead of Linseed. Negroes eat Benni oil mixed in their messes made with Indian meal.

six or seven years old fatten most advantageously to the grazier. Their summer grazing is commonly but a preparation to stall-fattening.

Observations on Cattle, Sheep, and Hogs.

In judging of the preference to be given to different kinds of cattle, size is far from being of the first consideration. Their being a large kind implies *bulk* rather than *character*. It may be presumed the mass of meat and bone contained in three beeves, generally requires *no more food* than the same quantity in one beef. But there is a rage in America for *large* horses, *large* cattle, *large* sheep, *large* hogs; whether they are more or less docile, active and productive of net income, or are kept and fattened at more or less cost or not. This formerly was a distemper of the mind among farmers in England; of which they have been cured by experience and the observations and communications of ingenious investigators on the nature and qualities of the several breeds respecting *use* and *net profit*.

The common cow-kind of Maryland are valuable; as they are hardy, feed cheaply, yield milk of good quality and in quantities if *housed* and *well kept* in *winter*, are docile, laborious, and give a fine grained good meat, with a due proportion of tallow. But being in common very meanly kept, they want

size. When well fed and housed, they are of a good size for all useful purposes.

Northward of the Susquehanna, this old breed is mostly supplanted by new kinds, imported from Europe and valued more for their great size and heavy appearance than good qualities. They have large bones with a deep flat-sided but massy appearance, and their fore-quarters are heavier than their hind; in some breeds amazingly so: which indicates their keeping and fattening hardly and costly; besides that their meat is coarse and they are disproportioned in their weight of bone. The old breed of the country have the fore and hind quarters weighing nearly alike: mine at Wye had the hind-quarters a few pounds heavier than the fore. What a contrast to this is the weight of the quarters in beefes sometimes killed in Philadelphia! The common weights of my—

	lb	lb
<i>Wye</i> cattle, from grass, the fore quarters .	122,	hind 124
A <i>Philad.</i> ox, highly fed from a calf, .	403	280

The famous Blackwell ox has been reckoned the finest though not the heaviest beast ever killed in England. His *hind* quarters weighed more than the *fore*, nearly in the proportion of the old breed in Maryland. His legs were very small-boned and neat,

neat, according to the picture and account of him published.—This *Blackwell*, not Bakewell, fine boned ox weighed thus :

The two fore-quarters 1057lb
hind-quarters 1067
<hr/>
2124

How very different from these are the huge lubberly beasts, once in fashion in England and now becoming so in America ! which are imported into different parts of it. One of that character was killed in England, under five years old : a short-horned, big-boned clumsy beast ; and weighed,

The two <i>fore</i> -quarters 1107lb
hind-quarters 924
<hr/>
2031

A big-boned steer, killed in Philadelphia, weighed,

The two <i>fore</i> -quarters 805lb
hind-quarters 560 : and

A big-boned steer in New-Jersey,

The two <i>fore</i> -quarters 758lb.
hind-quarters 525.

The Maryland old breed if well fed and sheltered, would be a good size : and if cautiously mixed with

other breeds, the most *useful* and *productive* of *net income*, would be improved. But it is with much caution that we should admit other breeds. There are better ; and certainly there are much *worse*.

A Mr. Fowler, in England, with great care and judgment, changed for the better ; in chiefly introducing Mr. Bakewell's long-horned beef cattle : which are not so remarkable for great size or *quantity* of milk though *very rich*, as for their giving *meat* on the parts which sell for the most money by the pound *from a given quantity of food* ; and for their fattening on *less food*, and that on the most valuable parts. The horns of the few I have seen, though long were very slim : either hanging downward, or standing wide nearly at right angles to the cheeks. Yet the experienced Mr. Bakewell allows for such cattle but six feet width of stalls for two cows, three feet each ; and eight feet for two bulls. More room he said would admit of their turning and dirtying each other. The young cows, *lean*, appeared to me like racers compared with the heavy big-boned cattle coming into fashion in America.

There may be breeds preferable for American farms to Mr. Bakewell's valuable cattle ; especially the *Suffex* old red, *Suffolk* polled, and the *Hereford* breeds : but it remains to be ascertained by experience. Mr. Young, speaking of *Suffolk* cows, says the quantity

tity of *milk* they give exceeds that of any other breed he has met with, and there is hardly a dairy of any consideration in the county of Suffolk which has not cows giving early in June, eight gallons of milk a day ; and six are common among many for a large part of the season ; and five gallons a day medium in a whole dairy for two or three months. It is also observed by him, that this breed is much inclined to *fatten*, and the *milk* excels in *richness* as well as being abundant.* Yet after Mr. Young had said this, and had kept of the Suffolk breed, and was well acquainted with Mr. Bakewell and his breed of cattle many years, he purchased for his own farm, a bull and two cows of the *Sussex* old breed, having had a great deal of riding in search for the purest of that breed ; they being esteemed excellent for *milk*, for *beef*, and for *oxen*. He gave about fifty guineas for the bull and two heifers, which were the best he could

* Lord Egremont has a *Chinese cow* ; which gives milk singularly rich. One pint of it, on experiment, yielded as much butter (4 ounces) as seven pints of the milk of a *Sussex cow* ; both were churned directly from the cows ; without being set for cream. This Chinese cow is described as being smaller than any Alderney cow ; seems very fat ; and as clean in the chap as a deer. This fact confirms other observations on the *quality* of the milk of different breeds of cows. It is the *quality*, not the *quantity* of milk, that ought mostly to be attended to. *Suffolk cow's milk* is not so rich as that of *Sussex cows*. 20 An.

could procure in Sussex. The *Suffolk polled* cattle cost rather less money.

Besides the *Suffolk polled* and the *Sussex* breeds, there is a *Hereford* breed, preferred by Mr. Marshal and Mr. Campbell, as the best in England for oxen, for dairy, and for fattening. The European cattle perhaps best worth attention in America, are the *Bakewell* long horned, the *Suffolk polled*, the *Sussex* and the *Hereford*; also the smaller English breed mentioned below, having small fine bones and being well formed, with generally a brindle or red colour and white along the back and across the thighs and fore legs or the shoulders; and likewise the white breed having a *yellow skin* and brown ears, also mentioned below.

There is on the other hand, a *large, bony, coarse* meat breed of cows, which give a deal of *milk and water*, rather than milk, and feed expensively. It has had its run in England against other breeds, till its bad qualities were noticed. Some of this breed are imported into America, and eagerly sought after: for they have *ulk* and certain fashionable fancied charms about the *hea: and horns*. Mr. Maurice, a farmer in England, as Mr. Young informs us, changed his better *Shropshire* breed, for the then fashionable Holderness and Dutch short-horned cattle, especially because they gave a great deal of milk; but he soon

soon found they were costly in feeding ; that they were tender in keeping, and gave the poorest milk. He thereon got rid of them for other breeds, chiefly Bakewell's.

Those short-horned cattle feed to vast weights ; yet are not profitable to the breeder, the grazier, or the dairy-man. How poor the milk ! twenty-four quarts of their *cream* yielded 16 $\frac{1}{2}$ lb of butter ; and the same quantity from the long-horned gave 28 lb of butter. From Suffolk polled cows, 18 quarts of their *milk* have given a quart of *cream* ; which yielded 1 $\frac{1}{4}$ lb of butter. " Holderness cows and their relations, the Fifes, give the greatest quantity of milk ; " and the coarsest grained meat. *Fine fleshed cattle* " give milk of a better quality and higher richer flavour." In respect to food, 30 long-horned, it is said, will winter 100 dollars cheaper than the same number of short horned. Mr. Young informs the world of these observations and opinions of farmers in England ; who attend to and well know the qualities of the respective breeds of cattle.

The rage for *large* beasts is not now so great in England as it has been, or as it is in America. The breeds having flat broad sides, large deep fore-quarters, large bones and legs, and that with their deep fore-quarters are lank on the hinder parts, have injured our better common breed in some of their best qualities.

qualities. Our old breed milk well, if housed and kept in good plight *during winter*: or, in other words, *if as well kept and attended to* as the favourite new comers. The Maryland old breed of steers will fatten in common 600 to 800. I have raised and killed of them fed to upwards of 900lb, at only five years old.

There is a fancy in country people by which they often estimate the qualities of cattle from their colours: but this is a false ground on which to judge of them. Different districts of people preferring some one and some another colour. The red, the black, brindle, brown, dun, pied, are favourite colours with different people. A cow is said to be *good* because of the *quantity* of milk she gives: but, this cow and her offspring may be *bad* on all other accounts, in comparison with other cattle. She may be tender, hard to keep, and give coarse flabby meat and poor milk. It is indeed observed of white cattle that such as have a *white skin* are tender in keeping: but there is a striking difference between white cattle having a *white skin*, and such as have a *yellowish skin*. They are different breeds, of different natures and qualities.

On my farm at Wye, were usually wintered 170 head of cow-kind, young and old; of the old breed of the country, and of various colours, though mostly red,

red, brown, and brindle. About the year 1774, I began to mix this breed with a rather small but well-formed, small-boned English breed. The cattle from this mixture were generally brindle or red with a dash of white across the shoulders or fore-legs, the thighs, and along the back. The stock was thus improved in gentleness and in milk. About the year 1785, these cows first had my fine bull, Horace, who was out of a country cow by a bull imported by the late Mr. Calvert, from Mr. Wildman a dealer in England. My cattle were further improved from this mixture, in gentleness, in draught, meat, milk, and size. As oxen they were active and powerful, and very docile. Horace and his sire had white hair on a yellowish skin, and their ears and noses were a reddish brown. Such Lord Anson found the cattle were upon Tinian; and he especially commends their gentleness and the good quality of their meat. Did Lord Anson or others import the breed from Tinian?

Farmers are imposed on by butchers; who by praises prevail on them to prefer the breeds having large bones, and that are deep fore-quartered heavy looking beasts; whose fore quarters outweigh their hind quarters, with the aid of their massy scimitar-like ribs. Why do butchers recommend this beast of bone? Or farmers receive their subtle recommendation? Is it because their appearance is agreeable to the farmer's passion for what is big? The choicest

meat

meat is on beasts having small bones. The Bakers well cattle and sheep have not the heavy appearances of the clumsy, big-boned, and flat-sided beasts preferred by retailers of meat : but they are greatly superior in their meat, and in cheap feeding.

Breeders of cattle will attend to the difference in *extense* of food requisite for the big-boned, and the small-boned lighter formed cattle : and the *consumer* of meat may compare the weight of bone and meat in a quarter of the small-boned with one of the large boned breed. The greater the proportion of bone, the oftener he recurs to the butcher. In general, small-boned animals, carry it even to man, fatten more readily and with less food than the large boned.

The first great error in breeders of live-stock, in America, is in their passion for the *largest kinds*. The *largest* and the *smallest breeds* are the very worst ; and ought to be avoided in cattle, and generally in all animals. The huge big-boned dray-horse is unprofitable. The scimitar-ribbed, flat-sided lubberly big-legged cattle, are expensive masses of unimportant bone, with an inferior portion of coarse meat *dearly obtained in the feeding*.

“ No quantity or quality of food given in summer,
“ will procure milk in good quantities, from cows
“ that

"that have been *poor in the preceding winter* ;" whether their mean plight be owing to a scanty allowance or poor quality in the food, or to a want of shelter. *Dry food* from straw, or from husks and fodder of Indian corn, cannot carry cattle through winter *in full flesh*, unless there be added some *juicy or moist food*, to prevent their becoming constive and hide-bound. Turnips and the common fleshy pompons may be given in the fore part of winter; the red thin fleshed more hardy pompon, potatoe, scarcity root, ruta-baga turnips, and other hardy roots or cabbages afterwards; and *drank* with any dry good food, till there is a *full bite* of grass in *May*. With common care I have kept the less fleshy pompon having a deep orange-coloured rind, till the 25th of March in a cellar having a small vent for vapour at the South front. Cows ought to have *hay* from a month before calving. The vines of field peas and beans are excellent for cows and for sheep.

That *salt* is advantageous to all live-stock is well known: but the giving it to them is not sufficiently attended to and valued. For health it is admirable and even necessary. It is said, it enables the farmer to increase his stock, as it *augments the nourishment* of the food eaten in proportion to the quantity of salt eaten; and that there can be no excess in the salt eaten, give as freely as you please. It also is said that salt greatly improves wool in quality as well

as quantity. It ought to be without stint always before the animals. Mixing it with water and pure fine clay in a firm mass, for them to lick it, as in their wild state, rather than to give the salt alone. In twenty years residence on my farm at Wye, a *salt water* river, and always having there upwards of 50 horsekind, I know of no instance of their having botts. Near 60 years ago a noted country horse doctor told me that once or twice a week giving salt to horses, effectually secures them against botts; which I have ever since well observed, and believe it to be perfectly just.*

S H E E P.

Mr. Bakewell's superior discernment and attentions, have produced a new breed of sheep; which is spreading over England, and is distinguished by the name of *Dishley* sheep. They are described as having fine lively eyes, clean heads, straight, broad flat

* Salt seems to be necessary to all animals. In 1775, I made experiments for producing nitre and common salt. A tobacco house yielded the former, and Wye river the latter. From the first trial of the river water was produced a pint of fine grained salt. From a rapid boiling the salt was too fine to be strong. It was spread in a dish, and placed on the ground in a yard to be dried and hardened; and was some days exposed to sun and wind. Numbers of small ants proceeding in lines, like Indian files, bore off grains, to them huge masses of salt, to their stores.

flat backs, round bodies, very fine small bones, thin pelts, with a disposition to be *fat at an early age*. They become peculiarly fat, with a very fine grained and well flavoured meat, above all other large long woolled sheep. There are much larger sheep in England. The weight of the Dishley carcases in general is, *ewes* three or four years old, from 18 to 26lb a quarter; *wethers*, two years old, 20 to 30lb. The wool on a medium 8lb a fleece: the length from six to fourteen inches. There have been muttons of other breeds in England, which weighed above 60lb a quarter. But large size was no object with Mr. Bakewell.

The wethers of the Dishley breed are killed when *two years old*; because they then yield the most profit; and if kept longer they become too fat for genteel tables. One killed when three years old, measured seven and an eighth inches of solid fat on the ribs, and his back from one end to the other, was like the fattest bacon. At *two years old*, they commonly cut four inches thick on the ribs, and two to three inches all down the back. Ewes fattened from July to Christmas give 18 to 24lb of tallow. Country house-wives cut off redundant fat, and make suet dumplings or paste of it: and some cure the sides as flitches of bacon. But, the great object, to Mr. Bakewell, of producing this very extraordinary breed of sheep, was the *superior quantity*

quantity and quality of the mutton obtained at the least expense of food and waste of time!

Mr. Cully, a noted breeder, says the mode of management of this breed is thus: “The *ewes lamb* in March, and then a few turnips are given for increasing their milk.* The last of June or first of July the *lambs are weaned* and sent to middling pastures. The *ewes* are thereon milked two or three times, for easing their udders; and such as are not

to

* I preferred to have my lambs drop about the 20th of March in general; allowing at the rate of 8 or 10 ewes in a hundred to give lambs early as is common. These few lambs, coming in December, January or February, perished at the rate of twenty or thirty in a hundred. What of them survived had a start of what dropped between the 20th and the last of March; but for want of green juicy food to the ewes, they were bony and poor; when the latter, from their dams having grass soon after their yearning, and when the lambs are so young as to require less milk at that time than the early lambs, were always thriving and in good plight, whilst growing of the grass increased with the growth of the late lambs. By July these were equal to the early lambs; and what is very important scarcely any of the March lambs died; so that in the one case near 100 lambs were raised; in the other scarcely 80. It is proper to keep the March ewe lambs from the ram till October come twelve months after they are yearned; and even the early lambs would be the better for it. My few early lambs were for early meat: but if among them there w^s a promising fine-formed ram or ewe or two, they were kept over for stock. This at Wye-Island.

to be continued for breeding, are put to clover till it fails : then they get turnips, and are sold about Christmas, very fat, at the price of 750 cents to 9 dollars. His sterling money is reduced to dollars and cents.

The *lambs* after being weaned adds Mr. Cully are put to turnips in the beginning of November, and continue at them till the middle of April or first of May, and then are put into good pasture on second year's clover. The second winter they have turnips till the clover is enough grown, generally the middle of April. They are clipt about the middle of May, and sold by the end of June for 9 to 11 dollars.

One third of the Dishley breed of ewes are reckoned to have two lambs each : so that 60 ewes have 80 lambs. They are put to the ram so as to have lambs at two years old ; and are kept for breeding until three or four years old ; except such as are of particular good forms or other valuable properties : these are kept as long as they will breed. Such as are defective in shape, suspected of being *slow-feeders*, or of having other unprofitable qualities are never put to the ram."

It is a rule applicable to all sorts of live-stock, to breed from straight backed, round bodied, clean, small

small boned, healthy creatures ; carefully avoiding such as have roach backs and gummy heavy legs with an abundance of external offal and lubberly masses of coarse—any thing.

Fifty or sixty years ago the sheep in Maryland were nearly all of one breed ; of which I should be at loss to find one at this time. They were light made, and clean boned ; giving at four or five years old the best flavoured mutton, dark, rich and juicy. The wool was in but moderate quantities, yet of good quality. They were called rat-tail sheep, from the tail being small and round.

The only sheep of Mr. Bakewell's breed being in America, that I have heard of, are what the Rev. Mr. Toofy, an improving farmer from England, brought to Quebec. Mr. Toofy lately died there. A country gentleman in Maryland, who had a number of farms, was offered in a letter from England, which I read, what he might want of Mr. Bakewell's Dishley sheep, to be sent to him by the letter-writer. But alas ! the gentleman declined all thought of having them ; and even said he should not answer the letter. I therefore wrote to the person in England. But the ship carrying my letter sprang a leak and put back. That I never received an answer was, probably, owing to the letter miscarrying ;

miscarrying ; from the English farmer who was to deliver it not having renewed his passage.

Sheep, on a Farm bordering on a Salt-water River in Maryland.

I usually sheared about 130 sheep, mostly ewes : they pastured through the summer, with little other attention than now and then counting them. In winter they also shifted for themselves, in fields of spontaneous grass and weeds, without being housed, or fed with aught else than a few corn blades, if snows happened to be so deep as to deprive them of their common pasture food, and some green food from tailings of small grain sown ; and also a few—too few roots, to 18 or 20 muttons. The flock however had a large range, besides the two fields of rubbish grass and weeds, sheltered by pines at the heads of coves. They found food amongst bushes and weeds on points and broken grounds along the margin of a salt water river.

An estimate might be made of a flock of sheep supposed to be improved when in numbers affording a shepherd constantly to attend them, feed them, and use the best means to preserve them in safety and good plight. But the statement below is of 100 sheep as they were kept by me, with too little care.*

M

Estimates

* The Flock, about 100 ; was increased to 130.

Estimates vary greatly. Scarcely two men are found to agree in the articles of charge and discharge; and the attentions and the neglects of sheep, with the modes of keeping them are various: which may apologize for the present estimate being so different from others. No charge is made of interest: it is but ideal when not really paid, and when instead of paying interest, I actually receive from the sheep, as so many bonds carrying interest, an annual income of above six times six per cent, on their value, with rent and all expenses. No charge is made for common casualties; because a flock systematically managed, is not thereby lessened or reduced below the designed number whilst new sheep are continually raised, at no perceptible expense, and fill up the place of those lost. So it is of the sheep sold off: their place is filled by the stock lambs kept for the purpose. It may be said of sheep so attended to, as is said of kings—they never die. When instead of their being lost they are sold or consumed in the family, we receive the value; for which the flock is to have credit in the account kept of them; just as money received on bonds. A lamb costs so little in raising him, that by the time he ceases to be a lamb his wool pays the cost. A charge might be made against sheep for damage in untilling ground; from their treading it and thereby eventually injuring the future crop of wheat, on an arable farm, more than their dung

dung scattered in scraps improves it: * but then, against this difference, may be set off in some instances at least, the advantage derived from their eating down or preventing to rise up into seed many sticky, stout weeds, which other live-stock suffer to grow up, foul the pastures, and reduce the soil. I have doubted of making a charge against my sheep for their pasturage; because in an arable system of husbandry some fields must necessarily be in grass, spontaneous or sown, and on these they graze: but on a grazing farm there is no rubbish field following a grain crop, so that grass is the only tenant which can pay the rent; and it would be nice and difficult to satisfactorily apportion the rent between arable and grazing fields. If upon the whole, between treading the soil and destruction of weeds, and the giving some small improvement from dung whilst pasturing, sheep do no notable damage to the soil of an arable farm, I see not sufficient cause for charging the flock a full pasture price for the pickings they get from fields turned out from tillage, at present, for the benefit of future corn crops or as being necessary in a common arable system. The little benefit which soil receives from sheep pastur-

M 2 ing,

* Sandy soil, not being the common or general soil of the country, is not here under consideration. The soils, in general, are loams and clays. The loam is of two kinds: that which partakes mostly of sand, called sandy-loam; and that which partakes mostly of clay, called clay loam.

ing, where there is not any summer folding, may be about balanced by damage in deadening the soil (other than sandy soil) with their feet, as it seems to me: but I conclude on charging 20 dollars for their pasturage.

An estimate of the income and expenses of 100 sheep, as kept at Wye in Maryland:

	Cents.
Corn blades, occasionally,	800
Winter green food and roots to 18 or 20 muttons	1000
Some flight attendance	400
Pasturage	2000
Taxes, washing, shearing	800
	<hr/>
Wool 338 lb, at 25 cents	8450
Lambs 40 out of 80, sold at 120 C.	4800
Muttons, 20 wethers at 240 C. } * 15 ewes at 180 C. } *	2700
Manure in pasturing, and treading the soil, opposed.	<hr/> — 15950
Annual Income	159 50
Annual Expense	<hr/> 50 00
Annual Profit	Dls. 109 50

This

* Distempers amongst my sheep were so uncommon and trifling that I recollect no instances of them. Accidents were very few; and I counted upon all being in health that survived their first summer.

This is a profit of 109 cents and 5 mills or 1095 mills on each sheep; which is more than lands distant from such a river can give, with no better management. In England, the Duke of Grafton's accurate account of seven years sheep business, gave an average of but 633 mills net profit on each sheep. His expenses were on keeping very small sheep, which gave but about $1\frac{3}{4}$ lb. of wool each, and were for grass, rent, county-poor and parish-rates, rye, rye pasturage, turnips, hay, barley, washing, shearing, carriage of wool, tithe, and interest. The 633 mills amount to 25 per cent net profit, on his capital. Others in England reckon they gain 110 to 400 cents a head, on their sheep. They speak of sterling money; which is here reduced at the rate of 100 cents for 4s. 6d. sterling; and 100 cents are a dollar, 10 mills one cent.

As far as dung is received by soil it ought to be allowed for; and this is meant of dung applied from stock *kept up* or *folded*: but how far it is to be valued when slowly dropt about in *pasturing*, is a question. Beasts constantly ramming the soil into a close compact state, untill it more than is commonly apprehended. That the foot of the beast does more damage to *wheat soil* than his dung so dispersed and exposed to exhalation and waste does good, is probable from several instances related of clover fields having been divided, and one half pastured on during

ing the summer, the other mowed twice, and both sowed at the same time with wheat on one plowing, when the mown gave considerably the best crops of wheat. Let it be supposed that a lay of grass has been left *unpastured* for three years; another like field at the same time is pastured close as is usual, during the same three years: now let the farmer walk in these, and observe how mellow, light, and lively the one is; how hard and dead the other. Which of them would he prefer for giving him a crop? If the former, it may then be suspected that pasturing but very little, if at all, improves the soil. When however pasture ground has been of *many years* standing, especially if clothed with grass for shielding the soil from the midsummer sun, it may have gained some little improvement from the atmosphere and the scraps of dung together, that will be equal to, if not greater than the injury from treading the ground. After two or three years, the settling and hardening of the ground, probably, will not much further be increased.

Amongst the attentions to sheep, it is advisable to suffer a few ewes to run with a ram, at large, for giving *early lambs*; and that the rest of the ewes be kept from the rams till the middle of October, and then be allowed a ram to 20 or at most 25. Their lambs will come from the middle to the end of March. It is also proper to keep ewe and ram lambs apart

18 or 20 months, from January or March till October come twelve months. It is best that there be not more than *one* ram with a division of ewes at a time; where they can be parcelled off into separate lots, for two or three weeks.

It is necessary to observe the ages of sheep: and some age ought to be fixed on by the farmer, beyond which nothing but great excellence in them as breeders should induce him to keep them. At shearing time the mouth of every sheep and lamb is to be inspected; and the lambs having blackish gums or that are not straight, well made and promising, are marked for sale; as also are the aged rams, ewes and weathers. Whatever is the age fixed on, for clearing the flock of old sheep, as many lambs, the *best*, are to be turned out for breeders, and for muttons, proportioned, as there are meant to be aged sheep disposed of; and a few more for supplying losses whilst they are growing up. The idea of four or five years old, was long retained from the practice of keeping muttons of the old *rat-tail* breed to those ages, for obtaining the best flavoured meat. But I prefer two or three years of age, for the new breeds in America.

The farmer will first fix on the number of grown sheep to be kept by him: then on the age he means to observe for disposing of them; for he is to have none

-none in his flock that are not in *full vigor*. Dividing the number in the whole flock, by the age at which he means to dispose of them, directs to the number of lambs he is to turn out, as a supply for the same number of sheep to be disposed of from the old stock: and a few more lambs may be turned out with the stock lambs, for making good any losses. If two years are fixed on, for the full age, and there are 100 sheep, the twos in a hundred being 50 times, direct to the disposing of 50 aged sheep; and to the turning out 50, more 4 or 5; in all 55 lambs. But the ewes are to be 4 years old. Then the fours in 60 ewes are 15 *ewes to sell*; and the twos in 40 wethers (together 100 sheep) are 20 *wethers to sell*. In all sell off 35 old sheep; and turn out 35 more 5, are 40 lambs to be raised. After 5 or 6 years of age, sheep decline in figure and wool. Brambles are charged by common farmers with taking off all the wool that sheep appear to have lost: but when sheep decline in vigour and good plight, they decline in the quantity of their wool, and look mean, even in pastures clear of brambles.*

HOGS.

* Mr. Samuel Jones, in an address to the Philadelphia county society of Agriculture, recommends that on account of the failure of wheat crops, from depredations by the Hessian fly. Indian corn, rye, and buckwheat [why did he omit barley, so essential to hogs?] should be the only corns sown; and that clover should be increased, for food to an increase

H O G S.

In Rhode Island a hog weighed 824lb. alive; and 715lb. when it was cleaned for market. Was it

of sheep. He says 10 acres of clover, with a small help, will pasture a hundred sheep. His estimate of expense and profit on the hundred sheep, is thus stated:

	Cents.	Cents.
100 Sheep, value 12000 : interest	720	
Salt 10 bush.	266	
Buckwheat straw, 6 loads	480	
Hay 2 loads	2133	
Indian corn 100 bush.	4000	
Deaths 5	600	
		8199
Wool 300lb	10000	
Lambs 80	8000	
Manure	2640	
		206.40
Income	20640	
Expense	8199	
		D. mills.

Profit on 100 Sheep 124.41. Each sheep 1.244

Of *Buckwheat straw*, Mr. Jones says: "it is found, by experience, valuable in feeding sheep during winter. The straw is put up in small stacks, soon as thrashed, round a pole fixed in the ground; salt being sprinkled amongst it, in making up the stack." This information agrees with that of an attentive tenant, in Maryland: and yet, in general, but little account is made of the straw of buckwheat; and till within a few years, it was but seldom saved. It indeed seems to be but lately that the *grain* has had its value and advantages

it fattened with a less quantity of food than would fatten four hogs of 180lb. each? Wherein is the advantage of having such a huge mass of coarse meat *in one* more than in three or four hogs of a better meat? The Chinese hog mixed with the American old breed of white hogs having stiff, erect ears, as I have experienced, gives an excellent breed, which is hardy, feeds cheap, and weighs 160 to upwards of 200. The meat of this breed is fine and close, curing well and preferred by those who have raised them. Of this mixt breed I killed a litter of thirteen pigs at eighteen months old; and they weighed when killed and cleaned, odds of 2700lb: an extraordinary instance!

But, it is said by farmers in Pennsylvania, that lumps of fat of the coarse flabby meat hogs soonest cloy labourers. This may continue to be an irresistible

known: and it is daily coming more in fashion and esteem. Even whilst growing it may be eaten as a grass, by cows. Its meal must be excellent in *drank*, and for working horses, mixt with cut straw: for hogs, at first dusted on potatoes, afterwards potatoes with maize meal; and in all *swill* and *wash*: also for poultry: but is never to be given to saddle or travelling horses; nor to horses or oxen when to be put to brisk work. It injures soil less than other corn; and is the most excellent *shelter to grass or clover*, sown at midsummer. Scarcely any thing equals it as a green dressing manure—the plants plowed in before they produce any seed; and it is the cheapest plant so applied.

ble motive with some classes of folks; when to others it will be disgusting and contemptible. Yet if we can oppose the 715^{lb} hog by one of 716, though it should be a mass of inferior meat, we shall have a something to give us consequence—the biggest hog! At a Nisi Prius court, in Maryland, a person was introduced to me, whose horse had lately won a race. This victory, as I was told, recommended him, though not before thought of, as being qualified to represent the people in their legislature. An election soon followed; and the horse—if you please his influence carried the election for his master, all hollow. So might 716 of even the coarsest flabby pork succeed against 715 of better meat. Quality is too little attended to.

The 19 An. 291, says wean pigs in nine weeks: sell sucking pigs at three or four weeks old: wean in March, and *not later than July*: litters average seven pigs; of which five are raised, after all hazards: and that in four months, seventy fat hogs gave 106 loads of *dung*; they taking that time to fatten. In Maryland they are fattened on maize given in ears, in little more than two months, from some time of October, and killed 10th to 20th December; weighing 150 to 200, after eating seven or eight bushels of maize given them in the ears: with which no food in Maryland, is found comparable for giving firmness to their fat. It is good economy

nomy to pen them for fattening, the first of October, especially where mast is not an object. They thrive best in a mild season; and the bacon may be early cured, before the approach of spring and warm weather. Salt is not given them that I know of; but I would offer it to them; to be taken or not at their pleasure, and not force it on them mixed among their food. Why do sows sometimes eat their pigs, though abounding with food? Is it for want of common salt that they seek to find the condiment in the animal juices?

The offal of milk is to be given to *weaning-pigs*, and *sows that have young pigs*: and the number of *young pigs just weaned*, and *sows having young pigs that can be maintained by the dairy*, should regulate the number of hogs kept, and the food provided accordingly. In other words there should be such a *succession in the litters*, that the *skim-milk*, *butter-milk* and *Cheese-whey*, may never be applied to other use than feeding such *young pigs*, and *sows that have pigs*. Ten cows may yield of such food, enough for keeping ten pigs, to be pushed forward into hogs. But, in some months the food will be deficient, and in other months superabundant. To make the most of such food, feed the pigs from out of *Cisterns* in which the milk is preserved. As I understand it, offal-milk and cheese-whey are kept cool in *Cisterns* under ground (so is water kept for years, though stagnant.)

There

There the heat is temperate ; perhaps about 52, and the milk that is excluded from the external air is little apt to become putrid. If it ferments, yet it goes not beyond the *acidulous* state ; in which it may keep a long while ; and common swill from grain, is known to be the best for swine, when it becomes sour. At any time, if there be more of offal milk than is wanted for the pigs, pour the overplus into the *cistern*.

MAIZE and POTATOES considered as Fallow Crops and Fattening Materials.

In estimating and comparing different materials for feeding live-stock, the value of the rent and culture expended for procuring them, and the condition in which the soil is left by the culture and crop, ought to be considered.

When potatoes are cultivated under *manurings* and repeated *horsehoing* or *shimming*, and then are *plowed up and hoed out*, the high state in which the ground is thereby left, preparative to a succeeding crop, pays for cultivating the potatoes. The ground is left in the best condition for receiving *barley and clover seeds* in the spring. *Wheat* cannot follow potatoes to advantage, in Maryland, because of the lateness of the season. But it seems just that the expense of cultivating and preparing the ground, should be apportioned between the crops ; because

as it is necessary that the cultivation should be given for gaining a good potatoe crop, it is equally so for gaining a good barley crop ; and both partake of it. Add the country value of both crops together, and ascertain the apportionment arithmetically.

The cultivation given to *maize* also leaves the ground clean and light for receiving seed-wheat or other crop. It however is far inferior to the preparation given in cultivating potatoes. No manure or but little is given the maize ground ; and it is left in hillocks and sinks. Apportionments are also to be made of the expence between maize and wheat crops.

When maize ground is *manured*, it is best not to sow wheat on it ; but leaving it a clean fallow till the spring, then (perhaps after adding more manure between autumn and spring) sow barley and clover seeds. Wheat is to be sowed upon plowing in this clover.

Cultivating ten acres of *potatoes* may cost, dollars 36.60 ; and it prepares the ground for a crop of *barley*, to follow the potatoes. What portion of the cost ought to be charged to the respective crops ? The value of the potatoe and the barley crops is to be severally ascertained. The potatoes produced by ten acres are 1700 bushels, at 15 cents they amount

amount to 255 dollars ; and the barley, 300 bushels, at 60 cents, to 180 dollars : together 435 dollars. Then,

D. C.

as 435 : 36.60 :: 255 = 21.50. the apportionment on the cost of *potatoes*.

as 435 : 36.60 :: 180 = 15.10, the apportionment on *barley*.

So on the culture of the 50 acres of *maize*, the produce, 750 bushels, at 50 C. amounts to 375 dollars ; and the *wheat* sown on it produces 600 bushels, at 100 cents, amounting to 600 dollars : together 975 dollars. The cost of cultivating the 50 acres of *maize* is 250 dollars. Then,

D. C.

as 975 : 250 :: 375 = 96.11 apportionment of cost on *maize* :

as 975 : 250 :: 600 = 153.89 apportionment of cost on *wheat*.

It is said, a hog of 224lb is fattened in 60 days with 24 bushels of potatoes and one bushel of meal. At which rate a hog of 160lb would require 17 bush. of potatoes, and $\frac{7}{10}$ of a bushel of meal. An acre ought to yield not less than 200 bushels of potatoes ; say 170, and of maize 15 bushels. Potatoes are best when boiled or steamed ; but the water in which they are boiled, is not to be given to the hogs ; it being thought unwholesome.

One hundred hogs weighing each 160lb, fattened with 17 bushels of potatoes and near three pecks of meal,

meal, each, will eat altogether 1700 bushels of potatoes, the produce of ten acres, and 70 bushels of meal, the produce of $4\frac{7}{10}$ acres : together $14\frac{7}{10}$ acres. The 100 hogs, if fattened with $7\frac{1}{2}$ bushels of maize, each, would eat 750 bushels of corn the produce of fifty acres.

See then the difference between fattening with *potatoes* and with *maize*. An expense in rent and culture is paid on 50 acres, for producing the requisite quantity of *maize*; when the rent and culture for producing the *potatoes* with a dusting of meal, are only on $14\frac{7}{10}$ acres : and,

$14\frac{7}{10}$ acres of <i>potatoes</i> and <i>meal</i> fatten 100 hogs	D.
weighing 16000lb, value	960
Rent and culture 3.65 an acre, off	54
	— 966
50 a. <i>maize</i> fatten no more	960
Rent and culture 5 dol. an acre, off	250
	— 710

The *potatoes and meal* cost 54 dol.—the *maize* 250 dol. The difference is 196 dollars, or 1.96, almost 2 dollars per hog. So that there is gained on *potatoe* feeding 196 dollars more than on *maize* feeding 100 hogs: near two dollars a hog.

Reckoning on four millions of souls, and ten of them to each farm, gives 400,000 farms. Each farm fattening ten hogs weighing 1600lb at six dollars a hundred

hundred, gains 96 dollars : and fattening on *potatoes* gaining 196 cents a hog, more than fattening on corn, gives an increased gain of nearly twenty dollars to every farmer who kills ten fat hogs, more than if he had fattened on maize : the 400,000 farmers gain 784000 dol. from fattening with *potatoes and meal*, more than if fattened with maize alone : and the superiority among all the farmers would be near 1,600,000 dollars yearly.*

Potato food requiring but $14\frac{7}{10}$ acres produce for fattening 100 hogs ; when *corn food* requires 50 acres for fattening the same number, is to each farm of 10 hogs 1.47 acres for potato ground, or five acres for maize : so that every farmer fattening ten hogs with *potato food* (including a dusting of meal) has the use of $3\frac{53}{100}$ acres ; and the nation the use of 1,412,000 acres, more than if the hogs were fattened on *corn*.

But make an estimate on what the farmers might gain without difficulty, rather than on what is supposed they do gain with inferior attentions. Instead of 1.47 acre in potatoes, double the quantity. Then 2.94 acres at 170 give 500 bushels of potatoes ; which at 17 to a hog (with seven-tenths of a bushel of meal) instead of ten would fatten twenty hogs on

N

each

* Perfection in estimates is not to be looked for. Different situations vary them, as well as difference in experience and habits of thinking. Principles are aimed at.

each farm. The superiority of potato food, would give the farmer near forty dollars, on twenty hogs, more than if he had fed with corn : and the superiority, among all the farmers in the nation, would be near sixteen hundred thousand dollars, yearly, besides what the ground, saved as above, would yield in other produce.

FENCE S.

Whether we have large or small portions of rail timber on our estates, it is advisable that a beginning be immediately made towards acquiring permanent live fences. It withal would be a pleasing work, giving a kind of new creation on the estates : and would afford the pleasing reflection to future possessors, that *this is the work of a provident man, who has thus benevolently promoted so much good, and set this excellent example of a well chosen employment.*

A scarcity of timber and even of fire-wood, sensibly affects the apprehensions of husbandmen in many parts of the country ; and it increases rapidly.*

We

* The chief dependance for *fuel*, in America, is *wood*. We have no *Turf* or *Peat*; but there already is found *Pitcoal*, in lower Virginia, and lower Pennsylvania, and in the interior is generally great appearance of coal; which in time will be brought to the coast, down the rivers Potomack, Susquehanna, &c. The coal from James River is good, though much of it

We may ask ourselves, how we are to inclose and divide our fields when in a few years timber shall be much more exhausted. Inclination to plant and raise trees from seeds, is too little felt ; and yet planting is a very important measure, which ought immediately to have its beginning, and then be always attended to in future, for restoring timber for all the purposes of agriculture. This business is avoided by some people, because they cannot live to see the plantation grown up into timber : or if it might be expected,

N 2 yet

small. In the use of small coal, there is an improved state of it, as practised in Flanders. To the dust of Pitcoal is added small coal that is sifted from amongst the dust, pounded and mixed with the dust coal. A tub is then filled one third with clay; water is poured on this and well mixed, till it is the consistence of thick cream. A hole is made on the heap of *coal-slack*, and the clay batter is poured in. All is then well stirred with a rake. Of this mass bricks are made in the usual manner, or it is formed into balls by the hand. After these are dried under cover, for two or three weeks, they are stacked for future conumption. The quantity of heat produced from these and the length of their duration is so much increased that a *bushel* of the balls will make a hotter fire, and last longer than the *same measure* of common coal, in the proportion of *eight to five*. First make a fire of common coal, so as to half fill the grate; then pile the balls a little above the top bar. A common grate thus charged will require no stirring, and will need no fresh fuel for *ten hours*. How convenient, lasting, and safe would this be for *bedchambers, studies, houses and rooms* for hacking, dressing, spinning, and handling the dangerously combustible articles flax, &c. To which note the improvements in expending heat by the Chinese and Count Rumford.

yet “there is enough to last my time: let those plant who come after me.” Others delay it from less blameable motives; the awkwardness and doubt how to begin it, in what method, where, &c. Let them, however, *begin it any how*, rather than continue to hesitate year after year.

There have been spirited endeavours of some farmers in Kent county, Maryland, to have fences requiring little or no timber. They cut up turf, laid it on edge, and filled in with earth scooped up, so as to form a bank without a ditch. They said, this fence is quicker made, than they could make a common worm-fence from the tree; which would require felling the trees, cutting into lengths, mauling into rails, carting in from the woods, and putting up. But this sort of bank fence was soon given up. The pretty green sides of the banks were cut down by horses, cattle and sheep; and in some instances droughts penetrated the thinner masses of earth, and killed the grass growing on one or both sides: then all crumbled away, and the fence was soon prostrate. These farmers had merit in the attempt to promote an improvement in fences. Their next design was to lessen consumption of timber by erecting posts with rails, instead of the common worm-fence. It may save some timber. Posts and rails look well, and are not yet out of fashion; though being chiefly of oak, the posts stand only a few years, and the fence frequently

quently wants repairs. Pleased with the appearance and the hope of saving timber, I completed a few hundred yards of a post and rail fence ; when reflecting how soon it would require to be renewed, and that timber then would scarcely be at command, the mind resorted to the usage of the old countries in Europe, where want of timber must have long since driven husbandmen to the experience of other modes. On inquiry, I clearly preferred their *hedge and ditch* fence ; and gave up posts and rails.

Various kinds of plants have been recommended for making live fences. Plants having small leaves are preferred, and of these such plants as have thorns and stubbed rigid parts growing close, for resisting the pressure of beasts.* In England are fences made with hedges without ditches, as well as with them. The last are greatly preferred : and some farmers say, “ A hedge without a ditch is no fence.”

Being persuaded that posts and rails must ere long give way to the more permanent ditch and hedge, and that it is best to take to these at once, I lost no opportunity of gaining information concerning them ; especially it was a question how thorn plants might be obtained in numbers requisite for making all my fences. In the mean while ditches were made, with intention to place posts on the banks, with two or three rails instead of five, as is usual when there is

no

* See Of *Bramble Hedges*, in miscellany notes.

no ditch, until young thorns meant to be raised should be fit to plant on the banks. Having white thorn trees from Europe, a quantity of their haws was sowed, not one whereof grew. In different years and methods they were afterwards sown, as were sweet briar seeds to no purpose.* The late General Cadwalader likewise sowed haws of the country thorn without effect, until he was informed that young thorns were seen to be grown through cow-dung dropt near a road. From this hint he penned up a number of cattle and fed them during winter with bran mixed with haws. The place was then plowed up and the dung of the cattle covered with earth. In the next summer the ground was there abounding in young plants of the country haw or thorn tree: but they were soon much injured by grass and weeds, for want of the ground being previously fallowed or cleaned.

Afterwards, about the first of March 1786, I procured a quantity of the freshest cow-dung to be put in a tub: warm water was poured on it, for reducing it to the consistence and warmth as if in a beast's maw. Haws were then thrown in, and all was stirred up and placed near a constant fire, for keeping it warm as blood, but no great exactness was

* The soil was a clay loam. In the *sandy loam* of Annapolis, haws of English white thorn grew readily, without being prepared.

was observed. It stood thus three days; and was at times replenished with more warm water, for preserving its heat and consistence, and frequently stirred. A clean well cultivated piece of ground was then opened with a hoe, and the whole contents of the tub were drilled in the row and covered.

On the 26th March 1787, I first noticed that young thorn plants were grown up from those haws in good numbers and in great vigour. Had the seeds been so prepared and drilled in the autumn 1785 when they ripened, they probably would have given plants in the spring 1786. With the like preparation it is likely that poplar, ash, juniper, cedar, sweet brier, bramble, coneiferous, and other seeds would as readily sprout and grow. The ground ought to be previously well prepared, that it may be clean and mellow for receiving the seeds: which growing in rows admits of the plants being perfectly and easily hoed.

It was intended to procure the hedges in two ways: by sowing haws along near the foot of the bank, next the ditch where the soil is best and deepest, there to remain; and by transplanting quicks from a well cultivated nursery. But it was prevented by the failure of the seeds, as above: and I removed from the farm before I could practise the new method of raising thorn plants from haws. To have good live fences there must not only

only be ditches with the hedges, but also a close attention is to be observed to weed and keep the soil clean, and the hedge defended from cattle and sheep, especially during the first three or four years: and the young plants are to be often *visited*, and may or not be trained to grow intwined together; but the side branches are to be shortened from time to time, and in due time the whole may be plashed. Gaps on these visits are to be looked for, and stopped before they become frequented by hogs, dogs or boys.

My ditches were $4\frac{5}{10}$ feet wide at top, 10 inches at bottom, 3 to $3\frac{5}{10}$ feet deep. The common labourers of the farm, men with spades, women with dirt shovels and hoes, after a few days of awkward work, will rid off these ditches at a good rate; and make a permanent bank five or six feet high from the bottom of the ditch. Two or three rails on this, whilst the hedge is growing, make a temporary fence that nothing will attempt to cross. When the hedge becomes full grown, there then is a perfect live fence, without any expence of timber: and it is liable neither to rot or to be easily pulled down.

It is a comfort to be assured that when designing to have thorn fences, we can readily procure any number of plants from haws. The nursery should be of good size, that the quicks may be very abundant, for selecting from them the best,

" It

“ It is a general practice (besides the law) in Scotland, that if one proprietor of land wishes to make an inclosing fence for his own convenience, adjoining to his neighbour who will not join therein ; then the first erects the fence entirely at his own expense, without claiming any part of the expense from the neighbour, until the neighbour avails himself of it, by making it a part of a fence for inclosing on his side also ; at which time he pays to his neighbour the half of the original expense in making that fence, and is at half the expense of upholding it ever afterwards. This is also a rule adhered to respecting partition walls that mutually belong to adjoining buildings ; and appears to be consistent alike with the strictest equity and good neighbourhood.” And. Eff. Agr. 28.*

I revere the memory of the husbandman who has left to travellers, the handsome legacy on the main road near New-Castle, a view of an excellent *thorn-hedge-fence*, a valuable pattern for their encouragement or imitation ; and have wished to see some sort of monument on the spot, erected by the neighbours or the county, for perpetuating the memory of the man who so early instituted the important lesson. “ Rewarding those who introduce advantageous practices

* By a law of Pennsylvania, if one farmer makes a partition fence, regulators value it ; and the adjoining farmers are compelled to pay their proportion of the cost.

tices in husbandry is good economy in nations; as husbandry is the most general and most necessary employment of their people.”

Doctor Hart also observes that—“ The true genius of animating agriculture must reside in those who hold the reins of government, and in gentlemen of all denominations: nor should rewards be wanting, nor public premiums, nor marks of favour: for, *as agriculture is the most useful so was it the first employment of man.*”

TREADING WHEAT.

This is an universal practice within the peninsula of Chesapeake: and in the early ages was performed in the old countries by oxen; as it still is in Barbary and some other countries. In Britain, and in all the American states northward of Maryland, the flail is the common instrument for thrashing out wheat: both modes are fixed habits in the respective countries. Oxen have been tried in Maryland, by a person who had been used to tread with horses; and he found them very exceptionable, from their immoderate and very frequent dunging as they trot on. I have had wheat from Barbary, which was extremely dirty from the tail of the ox.

Accounts of treading out small corns with *horses* may entertain persons who are unacquainted with
the

the practice; and the method following may assist farmers who are used to treading wheat, with some particulars for improving their practices. Until some other as speedy a method shall be discovered and introduced, treading cannot be dispensed with wherever the destructive wheat-moth-fly abounds.*

Prejudices against treading wheat are great, in those who are unacquainted with the superior methods of performing it: mine were so whilst I was but beginning to be a farmer in a country where the flail was very little used, and when treading, as far as I knew, was conducted in a slovenly manner. Some farmers still shift their treading floors from field to field; from whence much rough-feeling dirty wheat goes to market. Those who have a proper earth, in a perpetual floor used for treading crops of wheat, year after year, will have it glossy, and the wheat from it will have no more dirt than if thrashed on plank with flails; provided they are attentive in taking off the horse-dung directly as it is dropped, and let not the horses stop, to stale, until each journey ends and they are led off, and provided that as soon as the treading season is over, they cover the floor thick with straw or rubbish, to remain till a week or two before they are to tread
in

* The *thrashing-mill* certainly gives this method; and in every respect is superior for getting out wheat from its straw. But it is not used in America that I know of.

in the next season. They may fodder cattle on it all winter, keeping it full of litter, for preventing horses from sinking in and poaching the ground, in winter, spring or autumn: and thus improve the floor to be harder, more glossy and perfect.* When horses in halters are led in ranks, each rank kept as far apart from the others as can be, time is given for taking off dung dropt before the next rank tramples on it: and in this detached way of travelling the horses are kept cool. It is important that they do not close their ranks.

I was always much hurt by the injury done the horses in my former awkward manner (the common practice of the country) of driving them loose; and withal their driving, kicking, and jostling each other, helter-skelter; but am now quite pleased with treading wheat, since haltering and leading them in ranks prove the labour or injury is less than from ploughing them half a day in a maize field. The above are the only objections occurring to me against treading wheat with horses. The advantages are—an entire crop of wheat beat out before the end of July, which perfectly secures it against the moth-fly; it leaves but little opportunity to pilferers, and the wheat is ready for an early market, often the best. To hire thrashers or put my labourers to thrash it out

* To wet treading floors with a weak extract or tea of flax-seed, might add to the closeness and gloss of their earth.

out with flails, the time spent would give abundant opportunity for thieving, which is avoided by the speedy method of treading, when in about a fortnight three thousand bushels may be secured, instead of eighty to a hundred days that flails would require.

Treading floors are sixty to a hundred feet diameter. Some are only forty feet ; others again, a few, one hundred and thirty or more. The larger the diameter the easier to the horses. I never knew a horse disordered on a large floor, but on a floor sixty feet or under, it is not uncommon. The track or path, on which the sheaves are laid and the horses tread, is twelve to twenty-four feet wide. In common, the floors are inclosed by fences ; and the horses are driven, between them, promiscuously and loose, each pressing to be foremost to get fresh air, jostling, biting, and kicking the others with bitterness. Their labour is thus in the extreme. Small floors have a centre stake, to which hangs a rope, or a pole and swivel, and four or five horses being fastened together, travel round, upon the sheaves, abreast.

I presume not to offer instruction to farmers who are experienced in treading on large permanent floors properly kept and with horses in regular ranks : but to the less experienced and judicious, I submit the method I have used of late, as the best within my knowledge.

knowledge. My floor is unincumbered with any fence. A barn sixty feet square is in the middle of it;* around which the horses travel, on the bed of sheaves about twenty-five feet broad; so that the diameter of the whole treading floor is one hundred and thirty-five feet.

Previous to laying down the sheaves of wheat, the present state of the air and probability of its continuing, during the day, dry and fair, or its threatening a thunder gust with rain, is considered. If the conclusion be to tread, then the morning is suffered to pass away till the dew is off the stacks and floor. A row of sheaves is first laid flat on the floor, with the heads and butts in a line across the track of it as a bolster for receiving other sheaves with their heads raised on them; and these sheaves range with the path and circle, the butts resting on the floor. Other sheaves are in like manner ranged, with

* This had been an old tobacco house, which was conveyed in pieces to a newly designed, more convenient farm yard, at a new choice for the homestead and centre of business; the farm being full three miles long, and the old homestead, &c. fixed at one end of the farm. This old house, now re-built, was rather for a *shelter* to my cattle than for holding grain in the straw or for threshing grain out. My grain was stacked out of doors, and trod out on the floor round the house. The *farm* was very incomplete: it was but in outline; about to be changed from an old tobacco *plantation*, to a regular grain *farm*, divided into six equal fields.

with the heads raised on the former sheaves, till the whole floor be filled, and appears with nothing but heads of wheat, sloping upwards. The thickness of the bed of wheat depends partly on the length of the straw, and closeness and high range of the sheaves on the bed. Upon laying down the sheaves for the bed, their bands are cut on the floor with a knife, layer by layer. It is wished that the wind come from the westward, when treading. From the eastward it is generally damp. It is preferred to place the stacks eastward of the floor, for giving a free passage to the better winds from the westward.

In my treading, twenty-four horses are formed at some distance from the floor into four ranks; and when the floor is ready laid, one of the ranks has the word given to advance. For the sake of order and regular work, the boy who is mounted on one of the horses advances in a walk with the whole rank haltered or tied together, and enters on the bed of wheat, walking the horses upon the track laid with wheat: another rank is ordered to follow, as soon as the first is supposed to have obtained a distance equal to a fourth part of the circumference of the bed: and so of the other ranks. They are forbid to go out of a walk; till having walked upon the bed five or six rounds, word is given to move on in a sober, slow trot, and to keep the ranks at their full distance from each other, as the four cardinal points

of the compass. Regularity and deliberate movements are necessary, for preventing confusion. The gentle trot is continued till the horses have travelled eight or nine miles ; which is their first journey, and then they are led off to be foddered, watered and rested, while the trodden light straw is taken off as deep as to where the sheaves still lie somewhat close and but partially bruised : this is called the first straw —or first journey.

As soon as this first straw is off, one-third of the width of the bed is turned over on the other two-thirds from the inner side or circle of the bed. The horses are again led on, and trot out their second journey, till the straw be again light and clear of wheat. It is then taken off, as deep as to what lies more close. The horses are again foddered, and allowed to rest whilst the outer third of the bed is turned upon the middle part of the bed. Then tread the bed a third journey, till enough. This straw being taken off the whole remaining bed is turned up from the floor and shook out with forks and handles of rakes. The horses tread this well, which finishes their journeys ; unless it be to run them awhile on the chaff and wheat, the better to separate them. The whole being now shoved up from the floor, with heads of rakes turned down, the wheat and chaff are put up into heaps on the floor, five or six on my great floor : and thus is finished the day's

day's work; in which most of the time is taken up in breaking the stacks, laying down the sheaves, carrying off the straw, turning and shaking the grain out from amongst the straw: and lastly collecting the chaff and grain into secure heaps on the floor, which is also swept for saving scattered grains in separate parcels to be next day cleaned separately from the general masses of chaff and wheat.

The first journey is the longest and most laborious: but in the whole of the journeys, the horses travel but about twenty-five miles; and that is soberly, with frequent intervals of rest and refreshment. The heaps ought to be put up in a sharp conical or sugar loaf form, with more care than slovenly people allow them; the sides even and free from hollows, and suffer none of the sweepings to be thrown on the heaps. If rain falls on them, the wet edges next the floor ought to be shoveled up and thrown on the heap to dry. It is better to clean and store the wheat without thus exposing it to rain; yet, through necessity, I have had a great heap of trodden wheat and chaff which yielded near nine hundred bushels of clean wheat, exposed in the open air above two weeks without damage, notwithstanding some heavy rains fell on it. Now that I have a house at the treading floor, the wheat and chaff are shoved together into it, from being once fanned; and afterwards the wheat is well cleaned. As long as the

weather was dry it was found best to continue treading till the whole crop was trod out.

I know of but three or four farms having houses within the circle of treading floors. Mr. Singleton's invention is quite new. Four rows of stout locust posts deep in the ground, form three lengthy divisions; the spaces between them being ten feet. The middle part receives the straw from the treading floor: the other two are for wintering cattle, which feed at pleasure on the straw, through rails let into the posts, and which are moveable. The pitch is eight feet; and the whole building covered with thatch, is thirty feet wide, one hundred and twenty long, besides circular ends, according to the shape of the treading floor, for holding chaff, &c. The width of the track, round this building, is about sixteen feet; and the circumference of the floor or track is about 440 feet; of which 240 is nearly a straight course, and 200 circular from rays of 30 feet. Some farmers have a barn close to the east, the south or the north side of their treading floor. Two instances occur of treading *under shelter*: but their owners earnestly wish their wheat, whilst treading, exposed to the sun.

A neighbour, viewing the treading of wheat on my floor as above practised, said the method is admirably easy to the horses, and that most of the time is

is spent in taking off and carrying away the straw : but he thought it would be a saving, if the outer half of the bed should be trod till enough ; and then shift the horses on the inner half of the bed ; and whilst this is treading, the straw to be carried off from the outer half, first trodden.

Fig. 9, plate III. The common way of driving horses promiscuously, inclosed by a fence ; and one or two boys on horseback following and driving them ; in the present instance, along the outer part of the bed of wheat. *In this way, on a floor 90 feet diameter, I drove upwards of 30 horses.*

Fig. 10. My new method, with a barn in the middle, has no fence, which would obstruct the wind in passing to the horses : the horses led on in ranks quietly and orderly ; and then steadily trotted round on the bed of wheat ; at first as in the plate, on the outer half of the bed. Here my floor was 135 feet diameter ; and the work better performed with 26 horses. It may be as good if not a better way, to have the house on the outside of the treading floor, as at the farm yard in plate I.

Fig. 11. A barn and treading floor, proposed, on the principles of Mr. Singleton's barn or cattle house and floor. *aa* Rooms, at the ends of the house, closed on all sides, and floored, for thrashing

on, occasionally, or for storing wheat, chaff, &c.—
2. 2. Stalls for cattle—3. Passage between the stalls, to feed from. The pitch from the ground, 8 feet—A floor above to be 10 or 12 feet pitch, for holding straw, &c.—The dotted lines shew the track or bed of wheat in treading.

A house in the middle of a treading floor, gives some shade to the track on which the wheat is spread to be trod out; which is disadvantageous. The treader of wheat *dreads shade*; and invites the greatest *heat of the sun*, as being essential for treading to advantage. A house on the *south* or *north* of the floor, with one end near the periphery of the track, is as much preferable to a house in the middle of the circle, as this last is to a house covering the whole circle, where the horses are more worried whilst treading under cover, the wheat also being shaded, than if they trod altogether in the hottest sun. The hotter the sun, the shorter the work, and more perfectly finished. The house being on the *north* of the circle, casts no shade on the floor; and scarcely any at a little distance from the south side. The floor and the wheat are fully *exposed to the sun*; which is the first wish of experienced treaders: and for all purposes this house is here as well placed as if it was within the circle. In my design of a farm yard plate I. the treading floor and barn are so situated.

A Method of Registering Experiments.

The following statements are made partly on *previously designed experiments*; and partly from after thought on *results of field husbandry*. This last is an easy way of collecting experiments, without the tediousness common in conducting previously designed ones. The results of well registered process in cropping, often afford such matter for statements; especially when there are comparative processes. For instance, you have just now plowed in seed wheat, in beds or ridges, and observe the ground is left rough: what, you say, if it was to be now harrowed? But you determine on harrowing only every other bed or ridge, and observe the difference at harvest: and whilst the wheat is growing you will observe all particulars of it. You then register the process, the result, and state the question and answer; with what else occurs, in a note.

Experiments

*Experiments made in Maryland, in 1785, 1786.**

WHEAT SOWING.

No. I. ASHFIELD.

PROCESS—September 1785.

Sowed the south end on maize ground, after it was harrowed flat, under furrow; which formed *beds*. The rest left gently rounded by harrowing, was also sown under furrow; and left in moderate *ridges*.

RESULT—July 1786.

The *beds* gave plants equally stout from the very edges, quite across them. The *ridges* gave plants inferior about the edges.

Question—Are *ridges* or *beds* to be preferred?—
Beds are by this trial. (A)

(A) The maize had been thrice plowed from the plants, twice to them; which left the ground rather lowest near the maize, and highest in the intervals. A harrowing immediately before sowing did not quite level it. The wheat sown on this and plowed in,

* This method of registering experiments is taken from Mr. Marshal. And the experiments here inserted are from actual proceedings on my farm at Wye in Maryland.

in, and the water furrow or closing furrow being formed by a double mould-board plow dipt deep, left the wheat on flat *beds* of soil equally deep at the edges as in the middle: and the water furrow between bed and bed carried off redundant rain.— Other part of this maize ground, was twice plowed *from* and twice *to* the plants. This also laid the ground well, and the wheat grew nearly as stout on these low ridges (nearly beds) a very little raised above the water furrow, as on the above beds: except that some of the field, having the lands more raised, was formed into *ridges* which every where shewed weak wheat at their *edges*. My idea of beds and ridges is, where the lands are *rounded down on each side* to nothing at the water furrow, they are *ridges*: water drowns the edges, and the soil is there shallow: but where the edges are *abrupt* (nearly upright like strawberry beds) whether the lands are a *little* raised in the middle or are quite flat, they are beds, whose edges are raised above the water in the furrows, with a soil more equal in depth from edge across to edge. The endeavour is to have the beds quite *flat*. In reaping *ridges*, on the right hand at entering the sickle, and on the left at going out, the reapers drop many heads of wheat, which are lost: in reaping on *beds*, they cut evenly as the bed and its wheat range.

WHEAT

WHEAT SOWING.

No. II. MIDFIELD.

PROCESS—September 1785.

Eight lands, each 250 yards long, 7 feet wide, (including water furrows) were plowed into ridges, harrowed, sowed and harrowed in : eight others plowed in : these were alternately repeated through several acres. The whole equally and highly cultivated to 5 plowings, 3 harrowings, and a rolling.

RESULT—July 1786.

All very fine : not the least discoverable difference, on repeated close inspection by different people.

Question—Is under furrow or over furrow best? Equal in this clean, mellow, ridged or raised ground. (A)

(A) With great prejudices against harrowed-in wheat, I was agreeably surprised to find this harrowed-in equal to the plowed-in ; or over furrow equal to under furrow. Harrowing in, is not uncommon in the peninsula of Chesapeak (evidently used for dispatch) : but their fallows, so called, being twice rather slovenly plowed, are seeded in so foul

foul and imperfect a state, that harrowing in the seed proves greatly inferior to careful plowing in; from deficiency of preparative culture, as it seems. Their fallows are generally full of tufts and hard weeds, which scratchings with plow or harrow cannot reduce. Even when such strong weeds are turned in together with the seed wheat, they keep the ground hollow; which is a disadvantageous state of the ground to a good wheat crop—there is a want of firmness—of compactness in the soil; from whence it is that even the richest sand-land gives small crops of wheat. But as rye yields best in light land, a *clay* soil might for *rye* be the better, so kept hollow by strong weeds. My hope now is, that it will be found on clean, mellow, well tilled land (no seed ought to be on other) harrowing in will generally prove to be equal to plowing in wheat. If it should not, yet I should feel detestation in using that method of covering wheat, merely for the sake of a short cut. From a practice in the Fork of Gunpowder, in Maryland, where poor tenants often sowed rye upon stubble and then plowed it in (the soil a clay loam) it was said to give better crops of *rye* than when sown on fallow. Upon fallow, they said, the clay ground soon becomes too close for *rye*: but, when sown on stubble, the *stubble* gives the ground an artificial openness when it is plowed in. Yet query, of this supposed superiority, if it is not an apology for indolence, or want of ability to fallow the ground?

ground? But it is said, we have not time—have not force for plowing it in: alas! 'tis too true, whilst we feel not the value of spirited exertion on critical occasions, or aim more at riddance than perfection. That sameness of motion we are used to indulge in, is much against stout crops.

WHEAT SOWING.

No. III. MIDFIELD.

PROCESS—September 1785.

South end, sown in *broad flat lands*, and in *ridges* 7 feet wide (including water furrow) single and double. A north and south direction. The whole five times plowed, thrice harrowed and once rolled; —under furrow.

RESULT—July 1786.

The preference very striking: my overseer wondered at it. The ridges much better than the broad lands.

Question—Are broad flat lands, or ridges preferable? Ridges are in this instance of a very level field. (A)

(A) The soil, a good clay loam (wheat land) lying pretty dry and level. The single raised ridges were on a part of the field which was rather lower than

than where the double ridges were : from whence, being wetter, the wheat in them was inferior to the latter. By single and double ridges is meant raised so often by the plowings—increased in height, not in breadth.

WHEAT SOWING.

No. IV. MIDFIELD.

PROCESS—September 1785.

Six acres sown in ridges N. and S.—the rest with most of Ashfield; sown in ridges and beds, E. and W.—Most of the ridges were single : some double: a few triple.

RESULT—July 1786.

The north sides of the E. and W. ridges were universally inferior to the S. sides. This difference was greater in the double ridges than in the single; and very little wheat or straw grew on the N. side of the triple ridges.

Question—Are *ridges* in a N. and S. or E. and W. direction preferable? North and south. (A)

(A) The *beds* scarcely shewed any difference between their N. and S. sides. In some situations it may be necessary to sow in an E. and W. direction; and then *beds*; not ridges should especially be made.

ROLLING

ROLLING.

No. V. SANFIELD.

PROCESS—April 1786.

Fifteen acres in clover were rolled with a heavy roller, early in the month in a moist state of the ground. Rains in May prevented mowing it till June. Soil a clay-loam.

RESULT—August 1786.

The growth from April continually inferior to clover in a near field, sown and every way managed as this; except its not being rolled. The soils alike; and till the rolling, the growth of both was equal, and equally promising.

Question—Is rolling clover in the *spring* advantageous? It is disadvantageous, as seems from this comparison, on a *moist* clay-loam.

WHEAT SOWING.

No. VI. MIDFIELD—ASHFIELD.

PROCESS—September 1785.

Sown in ridges and beds, seven feet wide, instead of $5\frac{1}{2}$ as heretofore water furrow included: 200 acres.

RESULT

RESULT—July 1786.

The 200 acres were reaped in 12 days with 23 sickles; with as much ease as the same hands and number of sickles were used to reap them in 12 days on $5\frac{1}{2}$ feet ridges and beds.

Question—Are fields sown in $5\frac{1}{2}$ feet lands, or 7 feet lands preferable, for reaping wheat? Equal, by this trial. (A)

(A) It was an agreeable surprise to find the field in seven feet lands was reaped and secured in as short a time as formerly when in $5\frac{1}{2}$ feet lands; these narrow lands being esteemed best with single reapers. But a strong and a weak hand joining to cut down the wheat of a broad land, performed it with great ease. Strong reapers cutting lands separately from weak ones, often stop for them; whilst the weak ones, hurrying to get up to the strong, waste wheat; but when they join to cut the same land, the strong reaper readily takes the greater width of the land, and they keep together. By their more orderly proceeding, and not over reaching, as sometimes on single lands is the case, they avoid cutting off heads without straw, where the sickles enter or quit the sides of the ridges. My wheat was now cut cleaner and better saved, with less hurry than usual on single or narrow lands. The reapers were men, women,

men, boys and well grown girls. The best reaper and the worst took a land ; a second best and worst another land ; then two middling hands a third land ; from whence a steadiness and evenness of work unusual.

WHEAT SOWING.

NO. VII. EASTFIELD.

PROCESS—September 1786.

Sowed under furrow, rather wet ; the soil left in clods. Every alternate four lands, each 7 feet wide, was harrowed after plowing in the wheat ; the other four left unharrowed.

The result cannot be stated till after the harvest of next year, 1787. At present November 1786, as in September and October, what was harrowed after plowing in, shews wheat of much the best appearance. The great fallow harrow proved too coarse : the triangular maize harrow, with pointed or nearly chisel teeth, performed well in two bouts to each ridge of seven feet width.

Thoughts

*Thoughts on the Nature and Principles of Vegetation.**

The earth preserves plants in their place: and contains water combined with particles of matter that promote their growth, and which the water conveys to the plants, at the same time that itself is a diluent to them. The earth and the atmosphere, even in the driest seasons, contain moisture, which includes such matter, however minute the parts and proportions. The soil, then, besides supporting plants in their vertical or proper position, and the atmosphere imparts water with its nutritive combinations to plants, as a food to them. The earth and the atmosphere may be considered as magazines of the food of plants. The one gives it immediately to the roots; the other to the leaves.

Different kinds of soil suit different plants: to which husbandmen and gardeners are attentive as a fact known from experience.

I know of no soil incapable of producing useful plants. We have a poor earth, a whitish clay, which though of a fine grain and not hard appears remarkably dry, at times when you would expect it
should

* The purport of answers made to queries selected from a paper of the Board of Agriculture, in London, and dispersed amongst my friends.

should shew considerable moisture. Oaks and chestnuts growing on it are all scrubs; but pines grow to some height and size. The pine tree has a noble tap root. There is also as poor an earth which contains much of a rotten stone or granules of an imperfect ore, and another hungry looking soil, called black-jack land; it is sandy, gravelly, or clayey, topt with a poor diminutive grey moss: on this grow chiefly small scrub oaks; and in a soil something better, grow oak bushes four or five feet high, loaded with acorns. Common clay I have known to grow strong plants: in one instance dug up from two feet deep in the autumn, it was in the next spring sown with melon seeds: in another instance, the clay was turned out from four feet depth in digging a cellar, and two years afterwards the hillocks, as formed in turning the clay out of barrows, were sowed with melon, cucumber and cimblin or squash seeds. In both instances, eighty miles apart, the growth and duration of the plants were excellent. Probably the food to these plants, which have not much of a root, was nearly altogether from the atmosphere.

When it is asked if there are any plants which will grow perpetually in the same soil; and what are they? It may be answered, grass will; and that hemp seems likely to give perpetual, or at least repeated crops for many years on the same ground a little manured. It is on the contrary a prevailing opinion

opinion that flax cannot be continued, crop after crop, on the same ground, with all the manure and culture that can be given it. But who has experienced it? I grew hemp twelve years on the same ground, two acres, without manuring in the time; and the failure was very little. The ground had been previously well manured; and it had a few intervals of rest: only a year at a time. Maize and tobacco impoverish ground greatly: as it seems much from a clean cultivation exposing the soil, fresh and fresh, to a powerfully exhaling sun with but little of shade from April till September. But I have known ground cultivated constantly in tobacco, many years; being frequently manured.

Some plants receive most of their food at their roots, from the earth; and it may be some food is received greedily by them, and other food is in part rejected. Other plants succeeding these, may receive it more at the leaves from the atmosphere; or take at the roots, what was avoided by the former. The peculiar nature and fitness of the food which different kinds of plants require, must be adapted to the absorbing faculties, and the organization, or the mechanism and structure of the vessels of plants, by which they respectively receive and assimilate their nourishment. From whence it may be expected that soil no longer suitable to some species of plants, will produce and promote the growth of some others.

Soil is exhausted by certain plants depriving it of the vegetable food deposited in it. Every crop in husbandry takes some: and though the atmosphere supplies the ground with more, yet it is seldom equal to what, in the same time, the plants take from the ground. Crops of grain often repeated, especially cause the impoverishment or exhaustion. Food of plants is gradually restored to the ground that has been exhausted by severe cropping. Whilst the ground is suffered to rest and settle into hardness, the accession is very slow: the ground cannot readily drink in the moisture lodged on it from the atmosphere. Deposited on the hard ground it is soon evaporated. When the ground is not trod close by animals pasturing on it, it will continue somewhat open and mellow, for readily imbibing moisture with its nourishing combinations. But by long resting, ground gradually settles into a compactness, and the tread of beasts adds greatly to its consolidation.

In the extensive country of the peninsula of Chesapeake, there is no appearance of *calcarious* matter in the soil.* There indeed are on some of the banks of rivers, Indian collections of oyster shells, closely confined to the edges of the banks. They are very little applied to the fields: and I know of but one instance of their being so applied. The clays there, having

* This is said of its appearance, without any chemical examination having been made of the soil.

having the appearance of marl, that I have seen, do not effervesce with acids. A great deal of gravelly and sandy poor land, is within the peninsula ; and there is much good wheat land, which yields the most perfect grain, preferred by millers for producing superfine flour : and English peas, sown early in the garden way, are every where a sure crop. I know lands in Maryland which have been under crops, mostly maize, upwards of an hundred years ; and in the last forty or fifty years in maize and wheat, alternately, with one year of rest, unsown ; and though they shew no appearance of any *calcareous* matter, yet they yield perfect grain. Pool's Island I have long known : in all which time it has been cultivated in two fields, alternately in maize and wheat. Its former proprietor who sold to me, and other old people have assured me that maize with one year of rest, had been the constant culture of it, till wheat near fifty years ago took place of the lay or years of rest ; which introduced the course to be maize, and wheat ; so that one field was in maize, the other in wheat, without any manure. All manure was applied to lots of tobacco, till tobacco was dropt about thirty years ago. The soil is a rich hazel loam on a good clay. I believe it has been cultivated above 120 years chiefly in maize and tobacco : and still the present tenant procures sure crops of perfect grain, much above the medium of the country in quantity and quality. His crops are

maize and wheat alternately ; yet the soil shews no appearance of *calcarious* matter.

Till lately I never heard that *calcarious* soils are more favourable to clover than other soils. At Wye in the peninsula of Chesapeak, where there is no appearance of *calcarious* matter in the ground, clover thrives admirably well. I once sowed there, on wheat which was sown on maize, the ground having been many years cultivated in corns, without being ever manured, 70 acres with clover seed, which gave good pasture : but war prevented its being renewed. I had before been used to mow good clover from lots of dunged ground, on this Wye farm. It was intended to repeat sowing clover seed, and extend it to all fields of winter grain ; with the hope that the *clover plowed in together with the remains of the grain stubble*, year after year would gradually meliorate the soil.* Gypsum did not answer as a manure (the farm being nearly surrounded by a salt water river). The fields were about 200 acres each : farm-yard manure not much ; and a want of grass
was

* For our encouragement herein see 2d part of Transactions of New-York society of Agriculture, pa. 106, where is the report of a successful experiment, in improving “ very poor “ loomy land grown over with moss, and yielding scarcely any “ pasture. It being plowed in the *spring*, and sowed with clo-“ ver seed alone, four quarts an acre ; the next year it pro-“ duced a considerable quantity of hay ; which was the *only* “ crop, and the land was much better afterwards.”

was a want of live-stock, and of every thing proportionable to the size and quality of the farm.

Well plowed soils in general, and all mellow sound soils retain moisture a due time: but they should have the faculty of readily imbibing moisture, rather than of holding it long stagnant: every fresh accession of moisture brings with it an accession of the combinations of water, as a food to plants: and it is better that the accession be gradual and frequent, than seldom and in gluts. Cleaning and pulverising soil are means of its receiving and imbibing moisture from the air. Manures add to the means: and some are especially remarkable for attracting moisture in the driest times, when most wanted. Gypsum dust is noted for having this property; which therefore to the lands in America, distant from the ocean, gives great fertility. But in Britain surrounded by the ocean, and otherwise abounding in moisture, it is said to be of little efficacy, as also it is the case near our coast and bays. Attentive observers say, where the gypsum dust is applied to plowed land, an actual moisture is to be seen in the driest times.

There are sandy soils in America, nearly barren for want of texture. Water passes rapidly through them, and manures have little to act on. Sandy soils are less adapted to manures of the warm fermenting kinds, than clay soils. Great rains long continued

are more injurious to maize growing on sand fields, than on clay or loam. They wash and carry down all before them, and the dilution is excessive. Maize thrives better on sandy soil in dry seasons than wet seasons: provided the plowings or horse-hoings have been and are continued to be incessant in changing the surfaces of the soil, till the tassel and ears shoot out. Droppings and remains of plants, as is experienced of the Magothy-bay bean, also green dressings from plants plowed in, improve sandy soil. When it is said, dung sinks in sandy soil, it may be better said that having but little to act on, its effect is scarcely seen. Give the sand tenacity and body, by adding to it a clay soil, and then dung it; even try virgin clay and sand well dunged. I have seen hemp grown very high on a mass of deep loose sand, near a tobacco house; and doubt not but that the richness in the sand was in vegetable food accumulated chiefly from tobacco scraps; which are greatly adapted to drink in moisture from the air, and tobacco abounds in vegetable salts. Manures which ferment are best for close soils. Dung and clay soil meeting, effect much good. Green dressings from buckwheat, clover and the like, are advantageous in sandy soils, as well as in strong soils. It therefore seems they not only ferment and open the ground (best in clay soils) but also deposit their salts and other vegetable matter, for attracting humidity from the

the air, and gently stimulating as well as actually feeding the plants, in sand as well as in clay soil.

Soil is in the best state for receiving seeds of plants, in spring and autumn ; as being seasons of temperate heat. The ground being clean and well pulverised, the seedsman is to follow and sow close after the plow or harrow on the fresh earth ;* and the seed is instantly covered, close after the seedsman : best in the evening and morning. A fermentation of manures in the ground, at some times, and lively soils when suddenly warmed after winter, at other times, occasion the ground to smoke, as it is called. The sudden warmth dilates the ground and gives a spring to moisture, which ascends from the earth more visibly than in common. Rivers of ice and house tops also emit such vapour at times of sudden warmth and thaw.

The sun evaporates a part of the humidity lodged on ground exposed to it, before the moisture can be soaked in. Shade defends it, against the sun effecting a quick evaporation. Shade therefore gives the ground more time for drinking the moisture in with its nourishing contents derived from the atmosphere : and low plants probably emit an effluvium to the ground,

* Kliyogg, the Swiss farmer, says this of spring *Barley*; but the reverse of *wheat*; which he says is better for being sown some days after plowing the ground : and so says Mr. Macro, of *wheat on clover*. Pa. 93.

ground, of an ameliorating nature.* Sheltering ground, in summer or winter, seems better than wholly exposing it to the sun in summer or to frost in winter. Temperate heat is probably best for the soil. I think but little of frost as an improver of soil. It indeed breaks clods; but the attentive farmer will not plow his ground too wet to occasion them. Frost is cold, and snow is cold; but snow prevents severe blasts from sweeping off the genial warmth of the ground, which with moisture naturally ascends to the surface of the earth. Moisture is chiefly evaporated by the heat of the sun in summer, and by keen winds in frosty weather†. Even ice is reduced by these winds. Pour water on the steps of the north side of your house, in a time of the severest freezing and windy weather: it quickly is formed into a sheet of ice; which continually diminishes afterwards, and in some days will be swept off, according as the wind is more or less powerful. I do not believe that frost or keen winter winds improve soils by an introduction of nitre. If such weather

* Excessive shade, such as would deprive the plants altogether of the sun, or of due light, or power to emit their effluvia and extend an atmosphere of their own, or receive gentle and invigorating air, is not meant; but only a due shelter and defence against injury from *immoderate exhalation*.

† It is not meant but that the wind is also a powerful means of evaporation in summer as well as winter.

ther improves soils, how rich ought to be the soils of the high latitudes ! There is it seems, at least in weather free from ice, a continual ascent and descent of moisture with its combinations, vibrating from the earth to the atmosphere, and from this again to the earth. Does severe frost interrupt its rout or intercourse ? What then is the consequence ?—When ground sheltered by a hollow fodder rick, during a frosty winter, October till April, proved for years more productive than where cattle were fed, in front of it, and there dropt their dung and urine,* was it because of particles of rich moisture rushing thither from all points, where being sheltered from frost and wind they were concentrated for future gradual diffusion to plants ? Here the ground, protected from keen winds and left open and mellow, is in condition for absorbing nutriment in moisture from all directions, unobstructed by frost, and unevaporated by sun and wind. Or did effluvia from the fodder and corn-husks within the rick or fodder-house, effect the improvement of the soil ? Or was it from both ; at the same time that the tread of cattle hardened and untilled the soil which was unsheltered ?

The common air gives necessary motion to plants ; which with heat promotes digestion, and a degree of circulation within them conducive to their growth
and

* See of this, pa. 125.

and perfection. Earth is not the food of plants ; but together with the atmosphere, it contains their food. Both are generally requisite to the perfection of them. Soil receives from the atmosphere, and it seems the atmosphere from the soil, in a vibrating mode, the nourishment of plants ; a due portion whereof, on its passages, is caught and conveyed to their roots and leaves. Heat causes evaporation, or promotes the ascension of particles of moisture from the earth to the atmosphere. This ascent of moisture is mostly in the day ; as the descent of it is in the night, whilst the heat of the air is diminished : and so probably are the times of ascent and descent of the juices of plants, in a kind of circulation within them. The air, which is never quiescent, glides along the surface of the ground, and commits to it particles of water with its combinations nutritive to plants, which it drinks in the readier and the deeper for the ground being pulverised and mellow. If the ground is close and hard, such particles deposited on it are not readily imbibed, but are soon evaporated. Of this I have observed instances in fields of maize. The well pulverised and frequently stirred maize field, shews moisture on the ground till late in the morning, and never any drops or spangles of dew. The less stirred ground shews such spangles early in the morning ; but they are soon evaporated as the sun advances, scarcely any of the dew having sunk into the ground. I have viewed with admiration, in the driest summers,

a clay-loam which had been *incessantly plowed* and harrowed, turned up by the plow with a fine colour, given it by moisture. This earth had some adhesion of its particles and crumbled ; for it was dry, in a dust, only on the surface, a little way, and moist under that from dews continually absorbed : and moreover, in the driest times, in winter as well as summer, temperate warmth with moisture ascends from the interior of the earth to its surface, and then to the atmosphere. On the driest spot of earth, scrape a place level ; and put a glass tumbler on it, bottom up. The glass will shew moisture on its inner surface. Well pulverised soil will catch and absorb much of the passing moisture, for the benefit of plants, which otherwise would proceed directly to the atmosphere.

Plants receiving a large portion of their nourishment immediately from the air, rather fertilize than impoverish soil, where they are not carried off from the ground, or suffered to run to seed. There are strong marks of plants meliorating ground by their leaves and other offal dropt, and probably from their perspiration ; especially of the pulse kind. Grain and all seeds rob the earth more than bulbous or tap rooted fruit does.

Wheat ought to have antipathy to the barberry bush ; because for some distance round it wheat is usually

usually rusted, although the rest of the field be free from it. The barberry leaf and fruit are very acid. Is it an acid effluvium from the bush that corrodes the wheat plant? If so, is rust or blight or mildew generally produced by means of acid or sharp effluvia floating over entire fields of grain from other acid plants or corroding substances?

Under growing chesnut trees, scarcely any plant thrives; nor under the oak. On the other hand the locust tree is an improver. Every thing thrives under it: the ground about it is better than what is not near it, evidently to the eye. The black walnut and the native black mulberry trees meliorate the ground: but none equal the locust tree; the pods and leaves whereof seem to have the effect that the humble annual plant called Magothy-bay bean has on sandy soils. Ginseng grows best, and is scarcely if at all to be found growing but in shady grounds in close forests: and this is the case with many other plants. I never saw any kind of snake-root grow but in the woods. Maiden-hair grows in shade, where the sun scarcely ever shines. The mosses delight in shade, under and on the north side of trees.

Plants on the sea coast, when not greatly exposed to bleak winds, thrive well. I have seen great growths of maize there, on very sandy soil: and on the banks of the Chesapeak, a wide sea-water bay, the

the fields are thought to bear cropping better, and sooner recover, than lands distant from the bay. All the old cultivated lands mentioned in page 227 are on the bay or salt rivers.

Heat increases saccharine matter in plants and brings them to perfection. A small field of maize was planted late. The August following was very wet and cool. There was little hope of the maize ripening. I shewed it to a sensible farmer, who advised me to let it grow merely for fodder. But having read of the blades of sugar canes being sometimes stripped off, in Antigua, for maturing the canes in wet cool weather, these maize plants were very early stripped of their blades, from the joint where the ears were peeping out down to the ground, for gaining more warmth from the sun to the ground and plants. We were afterwards both surprised at the ripening of a good part of the corn. Maize-stalks abound in saccharine juice. Melasses and spirit have been produced from them, for domestic uses.

The germ of many kinds of garden seeds perishes when the seeds are sown in a hot season on a hot ground, although raked in. I also suspect the germ of wheat is sometimes injured when sown in the hot season, as in Maryland, and left some time on the ground before it is covered. But clover seed strewed in March or April on fields of wheat, or on barley sown

sown in the preceding autumn, or in the same March or April, never fails, although uncovered. I have generally sowed so, in March ; and it is the common practice in February, March or April. Thus less seed answers : all comes up : none is smothered under lumps of earth.

Farmers say, plants grow mostly in the night. They observe it chiefly of maize ; which at times has surprising starts in growth.

Manure promotes the growth of plants by its fermentation and warmth opening the foil for readily admitting humidity from the air with its nutritious contents ; and for facilitating the extension of the tender shoots of roots : or by attracting moisture with its combinations from the earth and atmosphere : or by its depositing matter, that if not of itself nutritious to plants, at least it promotes the access of such as is nutritious to it. It is said ground is sometimes exhausted by a stimulus from manures. The plant is a more likely subject of stimulation, as having life ; and a stimulus to the plant may be a mean of promoting its growth. It also is said, lime exhausts land by its stimulus. It indeed has injured ground when applied in too great quantities ; which tends to reduce soil, in some degree, to a mortar : and the caustic quality of lime when applied immoderately may, so will salt, destroy plants, and also a part of their nutrition deposited in the foil. But in fact, it is nearly altogether

ther repetitions of exhausting crops taken from the ground which effect the mischief. The farmer gives once, and takes for ever. If lime exhausts ground by destroying the nutrition deposited there, it must be without having promoted any growth in the plants. The injury done by lime, is said to be from stimulating the ground, and with a kind of violence forcing it to yield great crops ; whereby the soil is exhausted : and indeed at length it is exhausted —by the crops—not by the manure. It is better to give the ground a moderate portion of lime at a time, and apply it more frequently. In England, it is laid on to upwards of 300 bushels an acre : in Pennsylvania to 100, as measured whilst unslack-ed : and ought to be renewed in seven or eight years. It sometimes happens with lime and with gypsum, and even with dung, that after having per-formed wonders, they are so much thought of and so long depended on that the soil is cropped to death, and then it is said, the manure, though at first suc-cessful, has by its stimulation exhausted the ground and left it steril : when in fact the numerous and se-vere crops exhausted it—a common case. A farm in Maryland, reputed a poor piace, was bought by a spirited farmer, whom I soon after visited when his plows were breaking up its old lay, deep. It shewed a good wheat soil. The history of this estate is, that an English servant had procured extraordinary crops from it for seven years. His time out, he went off;

off; and it was afterwards for many years cultivated by the master and his family in their own way. It then obtained the character of being a poor place; for that English John had worked its heart out by deep and much plowing. But the farmer who now bought it cheap, cultivated it boldly; and thereby restored it to the good name it had in John's time.

Wheat straw trod short in getting out the grain, proved to be so considerable a manure, on my Wye farm, that wheat sown after it, in September, on the ground to which this straw was given in April and instantly plowed in *muck wet* and *soft*, gave much of straw with inferior grain; in some measure as if the ground had been over-dunged. From whence it seems that straw *plowed in whilst muck wet* from soaking rains that have *softened* it, and in a time of due *warmth* in the air for fermentation is a considerable manure: when if it be plowed in under less favourable circumstances, it is scarcely seen to effect any good.

The turf dikes to folds, used in Scotland, prove to be such excellent manure, as to suggest the making trial of *coarse hay and grass mixed with good earth*, and heaped up together like the dikes, and sheltering them from sun and rain, as for making salt petre; but leaving the sides open to receive the rich humidity of the air.

Farmers plow the grounds of their orchards ; and take from them crops of potatoes, clover, or corns. They think it advantageous to the trees, to plow the ground about them frequently.

The earth is more thoroughly pulverised by the plow than the spade : provided that it is in condition to crumble before the mould-board.

The kinds of vermin and insects in soil, which I have found hostile to plants are chiefly worms and ants ; and in the air, flies and small beetles of various kinds. Until about the year 1772, the *mosquito*, described by Mr. *Dubamel*, was extremely numerous, common, and destructive in every year, to wheat after it was reaped. They did not affect plants. Although the taking notice of them in this place is foreign to the question respecting only plants, yet the damage done by them to wheat corn, was so immense and so constant for near twenty years, in Maryland, whilst all attempts to avoid them were made in vain, the despondency so great, and the accidental discovery of the means of avoiding them so important, that the mentioning it, together with the following circumstances cannot be here avoided. In that year, encouragement was held out, for the approaching new crop of wheat to be shipped immediately after harvest. The farmers exerted their powers, and sooner than till then was thought to

could be done, trod out, sold and delivered their wheat to the shippers, who were bold in this new experiment; which proved that wheat of this country, keeps well in ships, when carried to Europe on being shipped soon after it is reaped: and this getting out wheat immediately after harvest, has continually proved to be a perfect security against the moth-fly, from that time to this. From the year 1773, I usually trod out and sold my crops of wheat in July or August, of the year when reaped. From 1785, in every year, on the third day that my reaping commenced, I began to draw in the wheat, and then alternately trod and drew it in, every day during harvest. It was about the 19 of June when the reaping began: 24 horses, six in each of four equidistant radii, gently trotting on the wheat sheaves cut open, round a circle of near 400 feet, trod out near 200 bushels a day, medium. One day 416 bushels; the horses driven hard, on a wager of the overseer.* Our wheat treads out easiest in or soon after harvest, before it has sweat-ed: and the season is usually then very dry. This *moth-fly* was scarcely known, but in the peninsula of Chesapeak, and the lower country of Virginia and Carolina. The *Hessian fly* is a new comer, supposed to have been imported in the straw or beds of the mercenary Hessian soldiers, in the year 1776.

It

* See page 85. 204. 205.

It deposits its nits or its eggs in the plant close to the ground, whilst growing. The young are there in the maggot state, for some time stationary; and feeding on the tender blanched part of the stalk, wound and check the growth of the plant. Nothing is known to be done, at present, better against them than to give a vigorous growth to the plants, by manuring and cultivating the ground well; which admits of late sowing: and this greatly checks their progress. A few years ago they abounded in the country near Philadelphia; excepting in the highly cultivated district of rich land below the city. There I could not discover the least sign of them in the growing wheat of a number of fields; at the same time that on the side of the city towards Germantown, where the soil is thinner and not so well cultivated, few plants were free from them in the only field that I there examined. We have also numbers of small insects popularly called louse, flea, &c. which in autumn injure much of the young plants of wheat; like the fly on turnip plants, chiefly in dry weather. I never knew grasshoppers do any notable damage to wheat, but in one year; when, in Maryland, they ruined most of the fields of wheat, in autumn. It is still called the grasshopper-year. On that occasion I sowed some ground twice, and some thrice over again. In Maryland is also a fly called, from its smell, *chinch-bug*; the smell being similar to that of the

chinch or bed-bug: and I suspect that dropping its wings at times, it assumes something of the character of certain ants, which are sometimes with wings, at other times without them. The chinch-bug chiefly injures maize plants, by wounding them about the lower joints. It is not so generally mischievous as the moth and Hessian flies: but is it not nearly allied to the latter, which also, in the autumn *drops its wings where it alights to deposit its eggs, as I am assured by an attentive farmer of Chester county.*

NECESSARIES:

Best Product of Land: Best Staple of Commerce.

In the winter, 1769, under this title, I wrote on the scheme, then agitated, for introducing into general practice in the then American colonies the culture of *silk* and *wine*. It was some time afterwards printed and dispersed among my friends.

The philosophers, rather than the politicians of America, with the best motives, endeavoured to induce the country people to apply their labour and attentions to the culture of *wine* and *silk*; as it seems, without considering they might therein be seconding the wishes of a jealous connexion that we should apply ourselves to cultivating those articles
of

of luxury, rather than continue to depend on and cultivate the materials of bread; in which we then abounded as the first staple of our commerce, and the first necessary of life: and it was thought to interfere with the British farmer, though groundlessly; as Britain buys more bread than she sells, which has since been declared to the king of Great Britain by his council.

The *tobacco* colonies were already more dependent than the *bread* colonies: and it was observable that as the culture of *wheat*, and the manufacturing it into *flour* travelled southward, from county to county through Maryland, the tobacco culture declined, and the people became more happy, and independent of the British store keepers who had kept them in debt and dependent.

The persons in America who promoted the design of introducing the wine and silk culture, certainly did not consider it as interfering with or tending to eat out the better staple, *bread*: but it so forcibly struck me with having this very mischievous tendency that I could not withhold my opinion of it; especially as it was countenanced by a number of instances in history; which I considered as being supported by the then actual state of the wretched parts of Europe compared with the more happy countries of it—the southern with the northern—

the

the *silk and wine* countries with the *bread and beer* countries.

It is a principle of sound prudence that whenever in matters of government, law, and commerce, any material alteration is proposed, we should beware of latent consequences, and look forward and consider, however flattering appearances are, what may be the mischievous tendency of such innovation when adopted. It is *better to drudge on in a temperate and middle state*, than to aim at too much ; and, “ It is “ not easy to determine upon theory the success of “ political innovations.”

The first great essential of life is *bread*. If America had adopted the scheme, it may be supposed that with her silk and wine she also would have made some bread : so it is with the poor peasants of south Europe ; but her labour and attention being diverted more especially to raising the *luxuries*, which could neither properly feed or clothe her, she has alas ! only aimed at growing a scanty stock of grain, barely for family consumption, and falling short in that, becomes miserably dependent on foreign countries for a supply from them.*

See

* Italy formerly exported corn ; but afterwards became *dependent* on other countries for its daily bread. This is ascribed by the Roman authors to the *neglect of tillage*. Columæl. Præf. Suseton. Aug. C. 42.—“ The country about Volisso, in the

See the condition of the southern countries of Europe: all Italy, Spain, Portugal, a great part of France, and till lately that the cultivation of corn became the first object of the attention of its government, the whole of France, employing their chief labour and care in cultivating wine or silk: and though they are fine countries for yielding *wheat*, and some is cultivated in them, yet not aiming at *that article as a staple of commerce*, how constantly are they in want of, and how dearly do they pay strangers for bread.*

In

island of Chio or Sciros, in the Archipelago, is very pleasant, spacious and *fruitful*. The inhabitants raise 5000 weight of silk yearly; *with which they pay their tribute*. It is thought they lie under a curse of being *always destitute of bread*.” Thev. Trav.—The curse is but the natural consequence of their neglecting to cultivate a fruitful country in corn, for the sake of raising the gew-gaw article silk. Had the tribute been reserved in *corn*, their *attention* being thereby drawn especially to that object, the curse of wanting bread would never have fallen on them.

“ The Druzees, in Syria, do not grow corn enough to support themselves three months in the year. They have no manufactures. All their exportations are confined to *silk* and *cottons*: the balance whereof exceeds very little, the *importation of corn*.” Vol. Syr. vol. ii.

* It may seem an odd position, says Mr. *Hume*, that the poverty of the common people of France, Spain, and Italy is in some measure owing to the superior riches of the soil and happiness of the climate: and yet there want not many reasons

In the war of 1744, France in the midst of almost uninterrupted victories and conquests, whilst her labour and attention were applied to the cultivation of wine and silk, was compelled to make peace and relinquish her conquests, merely from a *want of corn*; when her enemies had only the barren island of Cape Breton to give in exchange. Ever since that forefelt scarcity, it has been her policy to encourage the cultivation of *corn*, in preference to all other articles of land produce: seeing and feeling, that however great and flourishing they may be in other respects, *bread being wanting, submission must follow.* This is
an

to justify this paradox. The fine vineyards of Champaign and Burgundy are cultivated by peasants who have scarce bread: but the farmers and graziers are in better circumstances in these countries. *Hu. Eff.*

— Connecticut is valuable for *grain* and pasture. Any country is happy where the people in common are plentifully and wholesomely fed, and warmly and decently clothed: thus it is in Connecticut. *Doug. Sum.*

“The inhabitants of the *wine country* about *Bingen* on the Rhine, are some extremely rich, and others extremely poor; the happy middle state is not for countries the *chief product* whereof is *wine*; for besides that the cultivation of the *wine-ard* is infinitely more troublesome and expensive than the cultivation of grain, it is subjected to sudden and great revolutions, which at once reduce the landholder to a low condition.” *Tour through Germ.* anon p. 64.

an axiom applicable to individuals, as well as to nations.*

It is reckoned by Mr. *Hume*, bad policy in Britain to obstruct the use of French wines ; when they ought rather to be encouraged in the application of their *labour in making more wines*, by the free use of them in England ; because each new acre of vineyard planted in France, for supplying Britain with wine, would make it requisite for the French to take the produce of a British acre sown in wheat, in order to subsist themselves : “ and it is evident, he adds, we “ have thereby got the command of the *better commodity.*”

Intimations have also been thrown out, in America, encouraging the people with flattering prospects
of

* After the battle of Blenheim, the French army wanted a large supply of recruits ; and there being a great scarcity of bread in the country, the French king ordered his public stores of bread to be well taken care of. The soldiers alone were well fed out of them, whilst the country people were starving ; which occasioned them through *necessity* to flock to the army, and enlist in crowds. 2 Ha. Hus. 338.—Here then we have an instance of the application of the axiom to *private* as the text is of a public *submission for want of bread.*—Mr. Hume says, “ There are many edicts of the French king, prohibiting “ the planting new vineyards, and ordering those lately plant-“ ed to be grubbed up : so sensible are they of the superior va-“ lue of corn over every other product.”

of great wealth to them, would they employ their attentions in cultivating *silk*. So it was that the first James of England, attempted to infect the minds of the people of England. But it is an employment equally inconsistent with the genius of the English, as of the American people—a feminine business at least.*

The *silk* raised in *France* yielded such an immense apparent profit, that king James repeatedly recommended from his throne, the raising *silk worms* in England : but the people fell not into his scheme, although perhaps more earnestly pressed by him and his servants than most other matters—even by the *Judges* on the circuits, however foreign to their office ; and there could be no doubt of the *silk worm* thriving and working as well in England as in other parts of Europe ; as appeared from many experiments, besides what are recorded in the transactions of their Philosophical Society.

It was not many years ere that brilliant business began to decline rapidly, in *France* ; where now it is quite trifling to what it then was : for, the “*profit* being *little else than apparent*, was not realised.”

The

* Yet it has again been attempted, lately to be introduced into *England*, by the society of arts, Temp. G. III. *Young's Trav.* in Fr. 98.

The people of England rejected the royal scheme for making them rich ; the *employment* being suitable only to effeminate, spiritless, slow nations : and it is observable that, all the world over, the silk culture flourishes chiefly among people of that cast ; who are every where in a state of miserable oppression or slavery. The very nature of the *employment* tends to enervate that hardiness and vigor, which is a general effect of manly labour and employment, and to effeminate the nation that shall ever stumble on it.*

But it is said, *silk* would be *women's* work. Be it so : yet if our wives and daughters, were to raise as much *silk* as would purchase all the clothing and food wanted, the *men*, undoubtedly, would become idle and indifferent to other produce in quantities. The lands would be but little, if at all, cultivated or improved ; and the *women* performing in a few weeks the business of *raising worms* and reeling silk, would become equally indolent for the rest of the year. Both the men and the women would, in time, become ignorant of husbandry and housewifery. Nor could the *silk* more readily purchase what we should want,

than

* "A large *silk work* has lately failed in France. Experience convinces me of infinite difficulty in the success of such a manufactory. The *fifth* and *fleisch* of the insect are also disgusting. I abandon the subject to its native climates ; for in houses it is intolerable to the meanest *peasantry*." Letter to Mr. Young, in 1791. 17 An. 511.

than money would. If a mountain of *dollars* was open to all the people, with which they should purchase what at present they labour in the fields to produce, can there be any difficulty in conceiving the wretchedness and dependency in which a country of people, so circumstanced, would presently be plunged? How totally ignorant the next generation, of agriculture, commerce and the arts! “The riches “and safety of a country consist in the number of “its inhabitants *well employed.*”*

The people of Carolina, long ago, were to be made rich from the culture of *silk*, and they entered heartily on the business, under every encouragement; yet, in twenty-five years, they exported only 251lb of raw silk, from their worms; and in the same time imported 40520lb, wrought; besides what was mixed with other materials:

* “Near Princeton New-Jersey, Anno 1794, are large plantations of the mulberry tree, for the culture of the *silk worm*. Some of the farmers greatly object to them, as interfering with more useful domestic occupations and encouraging habits of idleness.” Wansey’s Journal, pa. 193.

A Table of Raw Silk exported from the Carolinas to Britain, in 25 years; from 1731 to 1755: and of Wrought Silk, alone, and mixt in Stuffs of the Manufacture of Britain, imported from thence into the Carolinas, within the same years:

YEARS.	Imports.		EXPORTS.			
	Raw Silk. lb.	Silk wrought. lb.	Silk with worsted. lb.	Silk with Inkle. lb.	Silk with Grogram. lb.	
1731	—	970	537	—	—	
1732	—	774	892	—	—	
1733	—	1015	1341	—	—	
1734	—	943	937	—	—	
1735	—	1487	864	—	—	
1736	—	1223	516	—	—	
1737	—	691	790	—	—	
1738	—	1111	1177	—	—	
1739	—	1273	877	—	—	
1740	—	1454	1492	—	—	
1741	—	2798	2452	440	7	
1742	18½	1576	1350	144	—	
1743	—	1427	1262	122	—	
1744	—	1035	1296	181	—	
1745	—	544	615	184	40	
1746	—	929	590	330	3	
1747	—	1313	2050	386	—	
1748	52	1772	1658	155	34	
1749	46	1772	1065	74	—	
1750	118	1519	1258	223	50	
1751	—	2404	1933	291	—	
1752	—	3365	2860	218	7	
1753	11	3027	2236	190	—	
1754	—	2682	2300	374	150	
1755	5½	3416	2634	337	—	
Total.	25	251	40520	34982	3669	291
Medium per ann. \$	• • .	10 .	1620 .	1400 .	146¾ .	1 1/4

This

This is taken from a state of Carolina published by *Dodsley*, in London, in 1761 ; in which the author also says—“ I cannot help expressing my surprise and “ concern to find there are annually imported into “ this country (Carolina) considerable quantities of “ Flanders lace, the finest Dutch linens and French “ cambricks, chintzes, hyson tea, and other goods, “ silk, gold and silver lace, &c. by which means we “ are kept in low circumstances ; and though it may “ have the appearance of being, for the present, be- “ neficial to commerce, yet it retards our increase, “ both in people and wealth.”

It cannot be thought I mean we should be wholly employed in cultivating grain. It is only wished that we should *not drop nor at all relax from cultivating the articles of life, to the greatest extent* ; that in a course of traffic we may *make luxuries and delicacies subservient to them* ; and never let *necessaries* depend on *luxuries*. In raising all the necessities, “ *the better commodities*” for staples of trade, that we can, a safe game is played ; as we then have a moral certainty of our real wants being ever supplied ; and there will always be a surplusage of the necessities to sell or exchange with strangers for their delicacies and luxuries, whereby our imaginary or artificial wants would also be gratified.

Nor need it be objected to the making *wine*, by persons

persons who may be disposed to grow the grape and produce the wine for *family consumption*; but not at all for sale, lest it be extended to exportation. Individuals will choose for themselves, the application of their labor: but it is hoped that *legislators* and *men of influence* will rather discountenance than encourage the cultivation of articles of luxury, in quantities especially.

It is not a great many years since *wheat* first became a considerable article of exportation from *Maryland*, and then from *Virginia*. Before which time, acts of the legislatures of Maryland and Virginia, were not unfrequent for prohibiting exportation of *Indian corn*, because of a *scarcity* of it for answering the necessary wants of the country: and so inconsiderable was the quantity of *wheat* then sown, that the prohibitory acts scarcely, if at all, ever mentioned *wheat*. As much *Indian corn* was cultivated as the planter deemed sufficient for giving bread to his family, and food to his horses and hogs. Some indeed aimed to raise it for the market. *Wheat* was sown in a lot or patch, for giving puddings, pies, and wheat bread on high days. *Tobacco* engaged the chief *attention*. The planter always aiming at making as much of it as he could. All *dung* was given to the tobacco ground. What of *maize corn* the planter could spare from family wants, was sold for rum: the *tobacco* was partly consigned, and the produce laid

laid out as well in luxuries as necessaries; so that at the end of the year, if the planter was not left in debt, which he often was, he had little or nothing left but his land.

It was a striking instance of *wheat* being the *better commodity*, that as the cultivation of it advanced into *Maryland*, and then *Virginia*, proceeding from our northern neighbours, the *demand* and of course the *price* increased: and as the culture of wheat progressed southward, the country people became more improved in their sentiments, manner of living, and independency of store keepers, dealers in merchandize. Between *tobacco* and *hemp*, how great the contrast! *Tobacco* a *luxury*; *hemp* a *necessary* in great demand. It is in every sense the husbandman and politician can consider it, “*the better commodity*”—for private and for public advantage.

It however may happen in another century, that fine materials and manufactured goods will be articles of commerce from the interior country, far from navigation, rather than bulky, cheap, and heavy articles, because of long land carriage; whilst heavy, gross, and cheap articles will be from the countries near enough to navigation; of which *grain* is one as being too heavy, for its price, to bear a distant land carriage. Let us then continue to cultivate bulky *necessaries*, for the staple of commerce. The more
bulky

bulky the better; because it employs more ships. *Wheat* is therefore better than silk, as also for the before-mentioned reasons. *Tobacco*, although a luxury, is better than the luxury fur: and *rice* is every way better than indigo.

Probably, the chief export of produce in the maritime country between Connecticut and James River, will be *flour*: of South Carolina, Georgia, and the Floridas, *rice*, *cotton* and *maize*: North Carolina, *naval stores* and *maize*: Massachusetts and other parts of New England, *fish*, *cattle* and *horses*: Mississippi, *lumber*, *iron*, *hemp*! in ships built there, and never returning they are sold abroad.

It is said that in all countries there are spots of land too poor for any other cultivation than of the vine; and that it is the case in America. I know of no such soil in our America; and believe there is no soil suitable to the vine that would not produce some more useful plant. There are indeed *districts* of countries, abroad, poor and rocky, which produce delicious wines. They are in wine countries, where that culture has been somehow introduced, and then riveted on the miserable inhabitants, who mostly want bread. There are other *countries* equally *portioned* with rocks and poverty of soil, in as good climates. These produce no delicious wine—no wine

at all, or none for exportation : but they yield *bread*, abundantly ; and it is a requisite of comfort and consolation.*

Where of lands poor and rocky, *only an acre* can be cultivated to advantage, of better land clear of rocks, an hundred acres can be well cultivated, with less labour, in fields of grain. In the *former*, grain enough for a family cannot be obtained by culture. The proprietor of it therefore looks for a plant which will yield much of something from little land : and he pitches on the grape. But the vine requires manure ; and the acre of grapes takes as much labour and attention as the hundred acres of wheat. If poor land is best for the vine, it is so only with the additions of manure and the highest cultivation. Cultivate poor land equally well, and look about for a plant of more value, at least in point of use ; *hemp*, *flax*, *cotton*. But why the vine ? If employment is wanted, seek the *better employment* in the *better land* ; and take example by the sufferings of a great nation ! If however you are positively impelled to grow the vine and make wine, yet be so considerate as not to lead

* The above speaks of entire countries, portioned with rocky and poor soil, which is cultivated for producing wine, and these want *bread* : but other countries equally rocky and poor, *regardless of wine*, are cultivated for producing *bread*, and therefore abound in it.

lead others to follow you in such barren soil, and such inferior employment and pursuit. Rather advise them to beware of such an experiment ; that they may make all happy at *home* in an abundance of wholesome *food*, and decent *clothing*, with the aid of their placid wives and rosy children, cultivating or manufacturing *necessaries* within themselves ; and sparing to strangers the surplusage of their *grain*, their *wool*, and their *hemp* ; *best commodities* ! choicest materials of DOMESTIC AND NATIONAL EMPLOYMENT !*

FAMILY SALT.

Many housewives prefer *blown*, or fine white salt for all purposes ; even for curing meat and fish. But their meat and fish are cured less perfectly than what the *Hollanders* and some other people salt and

R 2

barrel

* Bread and clothing, in ever so great plenty, cannot assure a permanency of enjoyments, but with the *means of defence* against plundering nations. The essential means of defence are *arms* and *ammunition* : these also are *necessaries* : and exportation of such of them as are manufactured in the nation, ought to be encouraged, till they become one of the staples of our commerce : for the more they are exported, the more will our nation abound in them ; and the surer will be our peace and independence. Peace is best preserved by being ready to repel.

barrel up. In America, as far as I know, we make no attempt to cleanse or refine the salt we use: and our meat and fish are rather dirty, and apt to become rancid and damaged.

The people of *England* have been used to refine the salt wherewith they cure meat: but it is said to be in an inferior degree. The *Dutch* people it is said, are superior to all others in the purity of the salt they use; and that their method of refining it is a secret among themselves. How beautifully clean and well flavored is their meat and their fish in barrels: They are it is said obliged, by *laws well observed*, to purify all the salt they apply to provisions intended for exportation: and so are compelled to reap an advantage, in a *preference* at foreign markets; as well as incidentally to preserve such articles, in a *sweeter, wholesomer* condition for home consumption.

The Dutch use *bay-salt* from Spain, and Portugal, after having made it very pure. Salt is produced, generally, by *evaporating* sea water: and this is by means of the sun and wind, or by boiling the water. The method by *sun and wind* is *slow* and regular; which produces *bay-salt*, (on the sides of bays in ponds) and the *spirit* of the salt is preserved in a high degree. That by *fire* is *quick*, and gives *brown-salt*; which loses much of its spirit by a *rapid evaporation*

ration in *boiling* the sea water. This *spirit* of the salt is essential for keeping provisions; and when extracted and applied to pickle, gives an agreeable flavor: so that *bay-salt*, both as it has less of the *bad* substances, and more of the *spirit* of the salt, which is an essential of it, is preferable in its qualities to *blown* or boiled salt; besides its greater weight in the bushel.*

Lord *Dundonald's* method of refining sea salt, (which he seems to have applied only to British blown salt) is simple and cheap. An account of it will be acceptable to the housewives who are happily disposed to have things perfect, and who would feel ashamed to be behind their most active and ingenious neighbours in the perfect *neatness and usefulness* of their productions. With pleasure they will see their salt purified from the foreign mixtures, which tend to *foul*, make *rancid*, *corrode* and corrupt meat. Besides Lord *Dundonald's* method, for blown salt, given below, I venture to propose a trial of another mode, for coarse bay-salt, and for those who have not a conic vessel and the means of conveying and *continuing* the *heat* through a flue: though it is doubtful whether for want of such *continued*

* The *spirit of sea salt*, is of the nature of both the *vitriolic* and the *nitrous acid*. *Cavallo.*

tinued heat, it will prove to be effectual but with vast loss, with blown or fine grained salt; when for ordinary purposes, mere washing large grained bay-salt may suffice.

Lord Dundonald's Method of Refining Common Salt.

A vessel of a conical figure, having a hole in the small end, is placed near a fire: the large end uppermost. It is fixed so that it can be heated by a stove, with a flue round the vessel. It is filled with salt; $\frac{1}{20}$ part whereof is taken out and dissolved in water, just sufficient to dissolve it, in an iron vessel. This solution is made to boil, and is then poured on the surface of the salt, in the conic vessel. The hot solution being already saturated, will dissolve no more sea-salt; but as it descends and filtrates through the salt in the vessel, will *liquify and dissolve the magnesia salita and magnesia vitriolata*, which drop out at the aperture of the vessel below. When it ceases to drop, take out another $\frac{1}{20}$ part of the salt in the vessel, which dissolve, and proceed as before: and repeat the like process with fresh portions of salt taken out of the vessel, until what salt remains be *pure as is required*. Three washings as above, render British made salt purer than bay-salt.*—Each operation

* So that whatever dirty appearances bay-salt has, more than English salt, it is so much purer from the corrosive nau-

operation renders it $4\frac{1}{2}$ times purer than it was before. Its purity will increase in the following progression : the first operation $4\frac{1}{2}$: the second 20 ; the third 91 ; the fourth 410 ; and the fifth 1845 times. The superior quality of the salt, thus freed from the *bitter, nauseous, corrosive* salts and injurious *slack*, is he says obvious to the taste as it is superior in its elegance and goodness in preserving fish, meat and butter. Newcastle salt, he adds, contains $\frac{1}{10}$ of its weight of those bitter, putrescible salts, which aid, instead of preventing putrefaction. A bushel, 56lb, of *blown-salt* contains $5\frac{1}{2}$ lb of those bad salts and mixtures.*

Lord

seous *bittern* and *slack*, that the *British* cleaner looking fine salt requires three purifications, for rendering it barely better than the *bay-salt* ; although each operation purifies at a four-fold rate. How very inferior, then, is the *blown* salt for preserving meat, in the state we buy and use it, without being refined.—Had Lord Dundonald any other salt refined, or in his view, than *British blown-salt*? It seems as if barely washing *bay-salt* in water, will refine it of its *dirt*, and make it superior to *blown-salt* three or four times refined as above. To give superiority to this *bay-salt*, after washing it from *dirt*, it needs only *one* of Dundonald's refinings. Then how superior would it be on three such refinings! yet I doubt of there being any injurious substance attached to *bay-salt* than what is external, on the surface of the grains.

* See "Thoughts on the Manufacture and Trade of Salt;" by Dundonald in a pamphlet.

Lord Dundonald refined 500 bushels of salt at a time, in one large conical hopper inverted.

Country families would find it advantageous to refine their salt for a year's purposes at a time. October is a leisure month, and salt is then cheap : but *August* might be preferable for preserving *heat* to the salt in the hopper. Thus would be always at hand a considerable *pure* salt for curing fish, beef, pork, and butter. When the salt is refined and dried it is to be beat or ground down till *fine*, and kept close from dust.

When salt is applied in a *powder*, it instantly strikes into meat, effects its purpose, and goes further than if it was coarse. Meat ought to be *struck* with *powdered* salt, in the moment when it becomes cool ; and not left as is common, for hours longer even in warm weather. Tendency to putrefaction soon commences ; and long before it is discernible. Salting should precede this tendency, and so prevent it ; for salt cannot so effectually *stop* putrefaction, as it can *prevent* its commencement.

A Method proposed for Refining Salt, in Country Families, on Lord Dundonald's Principles.

Make a hopper of four sides, as for extracting ley. Of the quantity of salt put into it, dissolve a twentieth part, in as much cold water as will just dissolve it.

it. The rest of the salt, before it is put into the hopper, spread and make hot in a moderately heated oven or pot. Whilst the oven is heating, the solution of the twentieth of salt is made to boil. Now place the *hot* salt in the hopper ; and immediately pour the *boiling* solution over it. For a second process on the *same* salt, take out of the hopper another twentieth of the salt, about the time when the drippings of the first washing are nearly ceased ; and as before, after dissolving it in cold water and boiling this solution, pour it over the salt in the hopper : and, preserving the heat well as you can, repeat it till enough refined.

All the salt procured from sea water, before it is refined, contains a very acrid, corrosive and extremely injurious substance called *bittern* ; so active, hot and searching it is, that casks can scarcely be made to hold it ; and also a magnesial substance called *slack*. They are so connected with the pure salt, and adhere to it with such firmness that it has been supposed they cannot be sufficiently removed by common washings in water : at least not without loss of a considerable part of the pure salt.

It seems that when common salt is crystallizing, the grains are pure ; and consist of little else than the muriatic acid, a purging salt, and a trifle of magnesial earth, with fixed air : but when the salt is drawn

drawn out of the liquor where it was formed into grains there adheres to the surface of every grain, an injurious portion of *bittern* and of the magnesia earth called *slack*, and much *dirt*. It also seemed to me that washing off the extraneous substances, would leave the salt considerably purified. In consequence of these reflections, I made the following experiment.

A box, open at each end, 3 feet deep, and 10 inches square, had a ledge nailed on, within it and near the lower end : on which was placed a moveable frame covered with doubled coarse open canvas, for keeping the salt. The salt was put on this. Upon the salt a like frame, covered with a single piece of coarse open canvas, was placed for receiving and spreading the spring water, which was then slowly poured on the canvas ; the box being suspended.

The quantity of salt was half a bushel, weighing 39lb, in its gross moist state. The first portion of water was two gallons, a quart pot full at a time ; which carried down with it dirt, *bittern*, &c. through the mass of salt and lower canvas. The liquor fell into a tub, under the box, and was very dirty. Four hours afterwards, two more gallons of fair water were poured on the upper canvas ; and the salt in the box was left all night to drain. It was then very clean

clean and fair; weighing in its moist state (after having been so washed) 28lb

Dried in an oven $25\frac{1}{2}$

Moisture evaporated $2\frac{1}{2}$

But it is more agreeable to consider it by the bushel. Then, a *bushel* of this salt would weigh, before it is washed, 78lb

—when dried, in an oven, before it is washed, as below, 71

Moisture evaporated 7lb

A bushel *washed* and left *moist* 56lb, as above; when dry 51lb pure.

—Inferior salt, obtained from the washings, dry 15
—66, for use.

—dregs, dirt, bittern and slack; and thrown away in skimming 5

Total gross dry salt, as above, 71lb

71lb dry; gross.

66 dry; fit for use, after being washed: of which 15lb inferior.

5lb, lost in skimming, dregs, &c.

The 15lb of ordinary, and much inferior salt, were recovered by boiling down the water which drained

drained through the mass of salt in the box, after it had stood to be clear.*

An

* The box used for washing the salt, had been applied to filtering malt-wort in brewing family beer. In one of which processes, not thinking of such an effect, I was surprised to see, on pouring fair water on the sand in the box, the day after wort had been strained through it, in order to wash the sand, that *the wort*, pressed on by the column of water, ran off for a while quite rich in the extract of *malt*; and then, all of a sudden, the water followed, with scarcely any apparent mixture of the two fluids.—The use of this *sand filtre* to wort, suggested the benefit that might be derived from some such contrivance in purifying the ordinary water drunk in some parts of the country: and the fact, of horses running on sand islands on the coast of Maryland and Virginia and scooping holes in the beach on the sea side, when the tide falls, and thereby procuring fresh water, led me to design a box of tubes vibrating in a space of about six feet square, so as to admit of 50 or 60 feet of filtration through sand; thereby I hoped that fresh water might be obtained from sea-water poured into a reservoir, as a head, and passing $5\frac{1}{2}$ feet down, then as many up, and so on to the end of the tubes; somewhat like the ascent and descent of water, in ebbing and flowing of the tides, through the sand on the sea-shore: and if it should fail of procuring fresh water from sea-water, yet it would be an excellent filtering machine, for clarifying spring-water.—Since writing the above, the experiment has been made; and a total failure to obtain fresh water is the result. The horses may discover spots where fresh water oozes out of the beach.—And now I ask myself, how can sand possibly decompose salt water?

An objection is made by country people to *bay-salt*, as being “too strong.” Strong of what? too strong of salt? If a bushel of *bay-salt* weighs 84lb, and a bushel of *blown-salt* weighs but 56lb; and a bushel of the *bay-salt* is applied to the same weight of meat, for which they find a bushel of the *blown* is sufficient, the former must then super-abound as 84 to 56: and thus it is that meat is sometimes “*oversalted and hardened.*” If the large grained salt be ground down to the size of smaller salt, measure for measure will be nearer to an equality of substance, in both kinds of salt; but weight for weight will be still nearer.

	Cents.
20 b. of <i>bay-salt</i> at 84lb. = 1680lb. at 80 c. p. 84lb. or a bush. .	1600
20 b. of <i>blown-salt</i> , 56lb. = 1120, at 80 c. p. 56lb. or bush. .	1600
Difference 560, at 80 c. p. ditto . . .	800
	<u>—2400*</u>

So that 80 cents worth of *bay-salt*, performs as much as 120 cents worth of *blown-salt*; and the latter, though it contains more of the bad substances, costs 50 per cent more than the former, for making pickle. For *dry-salting* the cost of grinding would be a trifle; which in pickling is saved.

It is said by Lord Dundonald, that the dissolved magnesia salts drop out: but what comes of the ^{1/2} of

* Two figures on the right hand, *in any sum of cents*, being dotted off, all on the left are dollars.

of salt in the solution? Is this $\frac{1}{20}$ attached to the general mass of salt, whilst the water of the solution carries down the magnesial dregs? If it is so attached, there is no waste of the $\frac{1}{20}$ of dissolved salt. Chemists, I believe, countenance the supposition that the salt in the solution, attaches to the mass of undissolved salt, whilst the dregs continue united with the water, and are carried off by it.

Although the common rule for making pickle, that it should *bear an egg*, may answer for some purposes, as where the thing pickled is for early use, yet for making a *full and true pickle*, sufficiently strong for preserving meat, fish and butter during a long voyage, it is presumable that the solution ought to be *boiled* down till the salt begins to crystallize; which is discovered by a fine scum on the top of the liquid, whilst it is still over the fire. The water is then saturated with salt, and the pickle is perfect.

It would be a fortunate circumstance if housewives, butter-makers and salters, were impressed with a warm conviction of the very important superiority of the *Dutch refined salt*, over *our gross impure salt*, and even over the *British refined salt*! the effect of which superiority is strikingly evident in the superior condition of their barreled fish. I have compared Dutch salted herrings with British.

British

British herrings were fine and large : far superior to the American ; and were clean and well preserved : but the superiority of the Dutch herrings, though smaller than the British, was great in the *neatness*, and especially in the *flavor*—Their fish, with the pickle, were a perfume.

B U T T E R.

The following method of making butter has been recommended, from the practice of a butter maker near Philadelphia : though several particulars of the process are omitted, as not being remembered. The churning was in the *evening* ; and when the butter was come, the milk was drained off ; and then the mass of butter was put in a wooden tray or bowl ; and a good quantity of fine salt was thrown over it, to remain undisturbed in a cool place till morning. In the morning it was again drained, and dashed with cold water for washing off the remaining salt and milk.* It may be next dried by a soft cloth taking

* Dashing on water, and then without pause, clearing the butter from every particle of water, is widely different from washing butter by kneading and letting it remain at all in the water. Very good butter for colour, flavor and consistence, is made by one who washes it twice, but never lets it remain in the water a moment. Another butter maker says, *mix the salt in the butter* in the *evening*, and let it *rest* till the morning : then work out the liquor ; but never let it be once touched with water.

taking up the remaining moisture ; and without ever wetting it again, slowly work it, and put it up for use. The best butter I ever saw, had never at all been wet with water ; as I was satisfactorily assured.

The following method of potting butter is promising without my knowing of it being practised :

Best common *salt* two parts

Sugar one part

Salt petre one part : beat them together, blending them completely. One ounce of the mixture, for every pound of butter, is well worked into the butter ; which is then put up close for use.—It is said, a comparative experiment has been made of it, with butter only salted ; and its superiority was great :—That cured with the mixture being of a rich marrowy consistence, and fine colour, never having a brittle hardness, nor taste of salt : and at three years old it is found perfectly sweet.—It is to stand 3 or 4 weeks before it is ripe for use : the salts will not be sooner blended. 1 Rep.

Fresh butter in balls, placed in kegs of brine *bearing an egg*, probably would not keep long : but, a brine so weak would admit of the predominant water rendering the butter rancid ; and might even admit of maggots in it. But would this be the case of a true *full brine*, when a little of the salt crystallizing,

lizing, shews it is at least equal to the water? If balls or prints of fresh butter were barreled up with such a pickle in tight kegs, perfectly tight against air, would not the butter keep a long while? And would it be without imbibing the brine?* It however is known that the Hollanders practise a different method, with success. The late Mr. Hill, when he resided in Madeira sometimes received from Amsterdam presents of butter in very small tight kegs filled in mass; but without any salt or brine. These little kegs were, each one, contained in a keg of strong brine. On opening the little kegs, the butter was perfectly *fresh*, fine in *colour*, in *taste*, and in *smell*: but if not soon used, it became inferior; as indeed would fresh butter made on the spot, on being exposed to *air* and *heat*. This gentleman also received compliments in salted herrings of the coast of Norway, which were very fine. He observed that large grains of salt abounded among the herrings; and supposes they tend to preserve the fish, from the cool nature of salt: but it is probable they were first struck and cured with fine grained salt.

S

“ Butter

* Collins on Salt and Fisheries, an. 1682. p. 138, says that he made such *very strong brine*; and in May potted up lumps of *fresh butter*, bought at market. Near the end of September the brine had eat through the pot; and then the butter was put to family use; it being *sweet*, *fresh*, good and well tasted. The lumps of butter were kept sunk in the brine.

"Butter is sent from the *Crim* and the *Kuben* to *Constantinople*, without being salted: but it is melted in large copper pans, over a very slow fire, and whatever rises is skimmed off. It keeps two years, fine tasted. Washing does not so effectually free butter from the curd and butter-milk, as boiling or melting. Salting the butter so melted and skimmed is the best method of preserving butter. Melting and boiling it down with care, does not discolour or injure the taste." Nich. Journ. II. p. 356. But it is apprehended that butter, *slowly* melted and kept hot, without boiling, would be injured by verdigrise from brass or copper vessels: if so, *stone* or well tinned vessels may be preferred.

Every motion ought to be *slow* in making butter: excepting perhaps in the act of *churning* or bringing the butter; which may be somewhat brisker, for *speedily* effecting the purpose. Till the butter is come, there is *nothing, no body, to be heated*, by mere friction or quick motion. A medium is to be found. The motion in churning may be, and often is too slow.

Butter is the better for having never been in *water*, or at all wetted, even in clearing it from butter-milk. If with *slow motion* for mixing it with very *pure fine salt*, and slowly pressing out the butter-milk, the butter be never touched with water,
but

but instead of *cooling* it with water, ice be placed round and under it, so however as not to wet it, and all this be done rather on a cold marble table, the butter may be expected to be greatly superior, in *colour*, in *closeness*, and in *flavor*. But it ought not to be beat, nor even pressed or squeezed with a *quick* motion. Every motion ought to be *slow*, in making butter. For getting out the butter-milk, sprinkle it with very fine salt, and after gently mixing it in, let it stand awhile before the fluid is to be discharged. It is said, there is no making fine paste, but on *marble* tables; which are *cleaner*, *sweeter* and *cooler* than any wooden tables; and that French pastry cooks use *marble*. The reasons are as strong for nice *butter makers* using *marble*. A slab of smooth if not *polished marble*, on a stout oaken frame, may be first made cold with ice; and a drawer close under the slab, filled with ice, would continue the cold, whilst the butter is cleansing.

R I C E.

The farmers in Jersey, Pennsylvania, and Maryland, have for some years had such destruction in their crops of *wheat*, from the *Hessian-fly*, that they now increase some crops and look about for other articles of crop to supply their losses in wheat. Some increase their maize culture; others rye. They might also increase or introduce barley, buckwheat,

wheat, pulse and hemp crops. As far north as Susquehanna rice may be tried: perhaps further. But why must *wheat* be cultivated; when fattening numbers of *live stock for market* gives *dung*, and procures more money than grain can; and is best for the ground and best for the pocket! some *wheat*, and for live stock others of the *corns* are to be raised: but never let a passion for wheat reduce the better design of cultivating live stock for the market, rather than grain for the market; at least not until our lands are restored to good heart.

Sixty years ago, I experienced that rice grew to perfection in the dry sandy soil of Annapolis; and a negro now living with me, has been used to grow rice on the loamy soil of South river, near Annapolis; the produce whereof was preferred by those who bought of him by the quart, to the best imported rice. In 1781, in a clay loam on upland, in Talbot, Maryland, I grew a garden bed of it, drilled and hoed; the produce whereof was good in quality and quantity.

Rice has been cultivated in *Italy* from early in the 16th century; but it will succeed well either on rich or on poor land; it requiring a soil of moderate fertility. It also is said in Italy that in valleys low and wet, it may be continued a length of time: in lighter and drier soils it requires a change, and is sown every

every other year; first *rice*, then *wheat*, &c. old writers recommend the cultivation of *rice*, for multiplying food in countries.

Mr. Romans, in his *Florida*, says rice will grow in any soil; though it loves watery soil best: and that the reason of letting water on it is chiefly to suppress weeds. The time of planting, he says, is from the departure of frost till the 10th of June; and that an acre will yield 16 to 1800lb. manufactured grain: a negro attending three acres very completely.

If rice be sowed in rows, and horsehoed between the rows, why may not a labourer cultivate as many acres of rice as of wheat in rows? In rows the plants can be easily and effectually kept clean of weeds, and the ground light and mellow. The stalks of rice whilst growing are so close and hard that the Hessian-fly could make no impression on them.

Staverinus says there are two species of *rice*: one of which when planted, is set nearly under water, so that the tops just appear above the surface, as the rice plants (in *Java*) would otherwise die, or be destroyed; for being too weak to stand against the wind by itself, the plants require the surrounding water to support them. The other sort, which is planted in the rainy season, on high ground, and upon

upon the mountains, receives the moisture it requires solely from rains. These two sorts, says his Translator, are always kept separate. The upland rice bears the highest price, being whiter, heartier, and better flavoured; and has the advantage in keeping. The low land or watered rice is of a watery substance, increases less in boiling, and keeps not so well as the upland. There are varieties in the species, especially of the *upland*. The smaller and the whiter kind is generally preferred in *India*; and this *upland* kind is there also called *mountain rice*. It was one of the objects in sending captain *Bligh* to the South Sea, to procure seeds of this *mountain rice*. He obtained some from *Timor*; which were sent to the king of Great Britain's garden at *St. Vincent*, and other parts of the *West Indies*; where it is said to be cultivated with success.

Besides *rice*, *maize*, and *cotton*, which will be continued the principal staple produce of the lands in *Carolina* and *Georgia*, the climate there will admit of other products which cannot be matured in the field husbandry of the northern states; such as will give fresh and dried exotic fruits, olives, olive-oil, angola-pinder or ground-nut oil, (superior to olive-oil, from an experiment I made in 1782) sesamum or benni-oil, cotton, &c. *Cotton* is an immense article! by the climate forbidden to grow in the *north-*

ern states. The *southern* possess this valuable *staple*, unrivalled by the northern states.

COUNTRY HABITATIONS.

Security against *fire* and *housebreaking* is peculiarly deserving of attention in building country habitations; detached as they are from the immediate assistance of neighbours.

In the time of the revolution war I lost two houses by fire, from accidents; and living on a navigable river, the house in which I then resided was beset in the night by a number of armed men. Their numbers could not be known, nor could they be repelled from within, otherwise than by first opening the door. They were let in upon terms. The house was badly constructed for defence; and I always disliked the common mode of building with combustible materials without reserve, especially in the roofs. The annexed drawing of a plan and elevation may afford hints to persons who would build in the country. It is not the intention to give a design to be particularly followed; but *principles* only, on which others may build to suit themselves. The principles on which this plan is formed, afford many conveniences and much room; little being wasted in useless applications of the area, which divides, in various ways, very advantageously. The middle rooms

must

must be very comfortable in summer, from being defended on the E. and W. sides from the sun shining on and heating the walls, and being aired by opening the S. and N. windows, and the partition doors occasionally.

The floors of basement stories in dwelling houses, are wholesomer and better when *solid* and of the common *earth* naked or laid with brick, stone, or cement, than floors laid upon joists over cellars or near the ground. Floors laid on joists near the ground or over cellars, confine a damp air under them long enough for becoming an unelastic dead air; which producing a mouldiness and smell of vaults, is mixed with the air of the rooms above, so as to be even smelt in some. Delicate people, used to dry warm houses of the towns, seldom take a cold on sleeping in log pens or houses having *damp earthen floors*, when they travel in the frontier of the country.*

Court

* In all *China*, says Mr. *Van Braam*, the houses are built upon the ground, without any cellar under them. The apartments are paved with flat, square bricks; a thing very agreeable in *warm weather*, but less so in severe cold weather, unless covered with *a wollen carpet*. To defend them from the pinching cold of winter, in the northern parts of *China*, they have *subterraneous furnaces*, outside of their houses, in excavations made on purpose; from whence *tubes* branch off in all directions, under the bricks of the floors, and under a kind of platforms or *estrades*, on which the Chinese sleep. They even pass

Court houses and other stone or brick buildings, having paved floors, and which are not airy, when shut up for some time, contain a somewhat stagnant unelastic damp air, which is also unwholesome : but this is not at all the case of *inhabited, much-frequent-ed, or airy houses with solid floors* ; when the air has some degree of current, and is all *alive*.

The floor of a basement story may be of brick or flag-stone upon the ground, raised a foot above the common surface. The second or best story to have its floor laid with rough strong boards or planks, only three or four inches wide, nailed down across strong stiff joists, and covered with a thick bed of a

strong

through the walls which divide the rooms, so that the heat diffused by these tubes produces in the apartments the temperature desired. *The fire is kept up night and day*, in the outer stove or furnace, without the least danger to the buildings; because a coat of bricks closely confines the fire. If the apartments be spacious and numerous, an increased number of stoves and tubes always insure the same result. It is an important advantage to enjoy, in cold weather, an agreeable heat diffused through all the apartments of a house. It is in these places especially where these outer stoves are wanting, and where there is a necessity of having recourse to brasiers of charcoal, (a kind of chafing dish or warmer) that the value of this invention is the most sensibly felt. He had before spoke of the *brasiers* or metal vessels of charcoal, carried about for communicating heat in the apartments.” *2 Van Braam on China*, pa. 65.

strong cement, the colour whereof should yield to utility.* Carpets may cover the whole. The wash-boards and surbase may be of cut stone or marble. The floor of the third story to be laid with thick narrow boards and cement as the floor of the second story; but the wash-boards to be of cement rounded off. Cellars to be under a detached building, or under the staircase, or some one room of the principal house.

Wood is to be avoided as much as possible. The door and window frames may be of stone or iron, and the doors faced or lined with iron.† The joists and

* Pieces between the joists stiffen them; and prevent lateral weakness and cracking of the cement. The excellence of the *Venetian plaster floors*, so much admired for their hardness and beautiful *polish*, says Mr. Eaton's Survey, p. 231, depends entirely on their being *strongly beaten*. The composition is only *fresh lime and sand* (with pieces of marble) used *almost dry*, and *beat till quite hard*, then ground even and polished. Common *earth*, as well as *lime-mortar*, acquires an incredible degree of hardness by *compression*, if it contains no more *moisture* than is necessary to make its parts *unite*. A kind of *artificial stone* may be made of *gravel* with a little *lime* strongly *pressed*, or *beaten into moulds*.

† In Italy, the *door and window cases* of their houses being of *freestone or marble*, the *floors brick*, and the *walls of the rooms painted*, contribute greatly to the security of their houses against fire. Brook on Italy, p. 236. They secure doors and *window-shutters* against the burglar's saw, by *iron inlaid*.

and boards for the platform roof and floors, also for the staircase if this should be of wood, are to be defended from contact of fire by cements. No outside cornish is requisite to a platform roof. Pent-houses and cornishes of wood, greatly facilitate the progress of fire in consuming houses.

Many houses of the ancient civilized world had, and the Asiatic and African houses on the coast of the Mediterranean sea, still have platform roofs. The houses in Algiers are so, and of one height ; so that the ladies visit from house to house and street to street, by walking on the roofs of the houses.* Platform roofs are cheaper than common ridge-roofs, shingled ; and are safer against fire inside and out, and against the pressure of wind. Most houses burnt in country places take fire in the roofs whilst

the

* At *Alppo*, the houses not being burdened with heavy clumsy roofs, gives the whole an air of inconceivable neatness. The roofs are all flat, and terraced with a *hard cement*. From each house there is a communication with the terrace above ; by which the inhabitants of whole streets enjoy the society of each other ; especially in cool pleasant evenings, without going into the streets.—During the time of the plague, it is particularly serviceable to the Christian European inhabitants ; who then shut their gates, and never go abroad ; but they enjoy society, air and exercise, from the tops of their houses. Their food is then drawn up in a basket, and carefully fumigated and purified, before it is made use of. 1 Tayl. Trav. p. 225, published in 1799.

the family is gone on visits or to church. Then it is that children or servants take candles or light-wood to rummage closets, cuddies, and cock-lofts, which usually are lumbered with combustibles: or flakes of burning foot fall on the shingled roof.

A platform roof may be thus constructed. Joists 12 or 13 inches deep at the big end, are to rest on the middle wall, and from thence slope two-tenths of an inch per foot to the smaller end on the exterior wall. Their thickness $2\frac{5}{16}$ or three inches. The distance between them 12 or 14 inches, from centre to centre. Or the joists may be equally deep from end to end; and battens which slope are to be fixed on them, for forming the platform roof with the said degree of slope. Between the joists, at every five or six feet, fix to them at right angles, pieces of plank, nearly the depth of the joists. These would add to their strength, as so many braces, preventing their weakness laterally.* Stout, rough, narrow boards, 3 or four inches broad, and a full inch thick, are nailed down across the joists with large nails; the better if ragged. The sun is powerful in drawing nails. On the boards lay a cement an inch or two thick, whilst it is hot in slackening burnt powdered lime-stone one part,

* The joints of the floors are also to be stiffened or braced; for preventing their being shaken, so as to injure the cement of the floors.

part, mixt with clean sand and brick-dust two parts. No more at a time is to be slacked than what the trowels can mix and work up whilst hot.* When the cement is dry, in a hot sunshine day, with a brush lay upon it hot *tar* three or four parts, and of *fish-oil* one part, well mixed together over a gentle fire. This coat may be repeated. Forbid walking on it for months after. Fish-oil corrects tar in its faculty of letting water through it ; and the mixture gives a close varnish. After this, lay upon the cement tar and fish-oil boiled down together till they become *half-stuff*,† and sift very coarse sand or small pebbles over the whole. Over this lay more *half-stuff*, now without oil, and more pebbles without sand.‡

The

* Dossie. In slacking no more water is used than what will well wet through the heap of sand : then to this add and mix up the unslack'd burnt limestone in powder ; and be careful never to *drown* the mass for a moment. This fault would be incurable.

† What in Maryland are called *inch-planks*, are *boards* in Pennsylvania. *Tar*, long boiled, produces *pitch*. When tar is but half boiled down, to a medium thickness, between tar and pitch, it is then called *half-stuff*.

‡ It may be tried by making a *bed of sand and pebbles dry*, and then levelling it pour on hot tar (or the mixture tar and oil) barely to soak through the bed. So it is, a gentleman of Carolina informed me he made beds of a sandy soil, formed something higher than the common level of the ground, for thrashing out his rice crops. With gourds were gradually

The method used for covering platform roofs in New-England, called there composition roofs, was lately given me ; and is as follows. "First boil a composition of *tar* and *pitch*, of about half made stuff ; and let it boil well. Pay over the boards : lay down the *paper*, beginning at the eaves with a double course ; always paying over the first before the next is laid on. Then lay the next course, about one-third to the weather, the same as shingling ; and lap each joint one upon the other, about two inches ; and so on till it is all papered over. Then pay it all over. Now take gravel, about the size of peas, or a little smaller, perfectly clear of loam. Put the gravel on about half an inch thick ; and having stood two or three days, exposed to the sun, in the cool of the day sweep what will come off in a heap : and then pay it all over again, and put on gravel as before. Then with a wooden roller three feet long and twelve inches diameter, roll it well in the heat of the day ; always adding gravel as it may require. A strip of lead half an inch broad is then nailed in the top of

the

poured upon one of these beds, many barrels of hot tar. After a while the beds became like stone. Above fifty years ago, I was shewn the kitchen of a Captain Lux of Baltimore. It was a house which had been used for storing barrels of tar. The floor was now a composition of tar and earth, and appeared like stone. I chiefly noticed the fire place, which also was a composition of tar and earth, appearing like stone, and was quite incombustible. So on wharves are seen *old* spots, where tar had been spilt, which cannot be burnt.

the eaves over all, to keep the wind from raising the paper. The composition is always to be put on boiling. The roof to have about two inches in three feet more or less. The joists are not to be more than 18 or 20 inches from centre to centre. The boards are to be well jointed, and the joints well broke. When they are nailed down, dub off the joints fair and smooth."

Mr. Volney, in his Syria, says that that people make use of a cement thus: "whilst the lime is *boiling* (according to the translation—*slackening* I presume) they mix with it one-third part of sand, and another of ashes and pounded brick-dust. With such a composition they form wells, cisterns and vaults, which water cannot pass through." I am informed this has been tried, from Mr. Volney's book, in the western country; and that it answers on a platform roof there.

Mr. Latrobe permits me to give here the composition of a cement used by him, and the manner of applying it to platform roofs. "The floor must rise about two or three inches in ten feet (two or three tenths of an inch in a foot.) First, lay a floor upon the *rasters*,* of narrow well seasoned plank cut into slips

* On such a flat roof are rafters requisite or not? Joists without rafters may have the proper *slope*; without the aid of rafters for that purpose. But are not rafters better for receiv-

slips not wider than four inches. 2dly. Lay down upon the floor with *boiling tar*, a coat of *sheathing paper*, such as is used for sheathing ships. 3dly. One bushel pounded chalk, or *unslack'd lime* or *lime slack'd in the air*, or of *water slack'd lime dried and pounded very fine*. Two bushels *clean coarse sand*, and as much *tar* as is necessary to reduce it to a substance that will spread *toughly when hot*. The *tar* must be boiled and the materials gradually mixed with them till they are in a proper state to lay on the paper. The stratum may be three quarters of an inch thick. Skreen gravel, so that the largest particles may be as big as large sized peas, and none much less than swan shot. Take a *very hot day*, when the composition is somewhat softened by the heat of the sun, and with a garden roller, *roll in* as much of this gravel as it will take. The floor will then be a beautiful pavement,

ing the unavoidable great weight or pressure of snow and ice? They bear up against the pressure, in some measure as an arch would: and the feet of the rafters place it all directly on the wall. Not so of joists receiving the weight.—Lengthy straight pieces of timber lying horizontally, swag with their own weight when they rest with each end on a wall: and the great pressure of weight bearing on them from end to end or wall to wall, is increased in proportion to their length or distance from the wall. Rafters are certainly requisite where the distance is considerable and the best security is sought. They ought not to be avoided for the sake of so little cost as they would occasion. Indeed, with rafters, the joists may be further apart, or a little smaller.

pavement, and may be worked in mosaick. This covering is so light, that very little timber is required in the roof."

A resister of water for some purposes, is equal parts of *rosin*, *turpentine* and *bees-wax*; which stands any heat not more than 140 degrees of Farenheit. Melt the ingredients together in a pot. When all the volatile oil, which causes the mixture to rise is dissipated, apply it hot with a brush. But it wants body for a roof. Add ochre.

In travelling from Philadelphia to Reading there is much of an earth having the cast of red iron-ore, and it occurred that it might be the same as the resister of water called Pozzolani: but I was not well enough to examine or view it otherwise than as I passed on. A factitious Pozzolani has been produced; which is said to answer the purposes of what is natural: and that it is cheap, and keeps well. In one hundred parts it contains 43 of *silice*, 35 of *iron*, 17 of *alum*, and a little of manganese. Those component parts of Pozzolani, are found in the earths of America. When earth or clay on the side of a bank looks frosted or hoary, as a salt exuded from the ground, if tasted, it sometimes proves to be an aluminous substance, which I have experienced on the banks of the Chesapeake.

T

Objections

Objections readily occur to new projects ; and it is right that they should be well weighed and considered. It is said platform-roofs may answer in southern climates ; but that in our more northern country, the weight of snow would be too great to be borne. This objection has the less force with me, who have had some experience on this head. I covered a house, thirty-six feet square, with a flat roof which sloped about a quarter of an inch to a foot. The joists of poplar were two feet apart ; nine inches deep at the upper end (the ridge of the roof) and about six and a half inches at the small end, where they rested on a wall. From the ridge to this wall was ten feet, and the joists from thence continued tapering further eight feet, where they rested on a plate supported by brick pillars. Pine sawed laths, inch thick, were nailed across the joists. Common weak oyster-shell mortar, from old Indian collections of shells, was laid on the laths, three-fourths of an inch thick. Tiles six quarters of an inch thick were bedded in the mortar. The joints were filled with tar and sand ; and the tiles and joints were covered and filled with half-stuff, on which sand was strewed thick and rolled. A gust of wind carried off most of the sand. Then again half-stuff and sheathing paper were laid on ; and upon the paper half-stuff, sand and pebbles. Gusts of wind blew most of the paper off ; and rain passed easily through. The paper remained on the roof over only one of the rooms ; which

which was tight, excepting in one place, where rains poured through, till a single thin coat of *tar and fish-oil*, laid on hot with a hair brush, totally stopt the leak. This roof bore the snows of near twenty winters, in Maryland, without the least attempt made to shovel off the snow. Mr. Latrobe's cement seems the best. It is tough, and cannot crack.

The leaking in this experiment was the more excessive, from the mortar being made of rotten shells ; which made an imperfect cement : and moreover, too much was expected from tar and pitch, as resistors of water ; when in fact they let it through rapidly ; until mixed with fish-oil, which proved to be a perfect corrector : neither was the paper properly fixed ; for it could not be nailed down. Though the joists were of a brittle wood, slender and distant from each other, yet the span from wall to wall was but about nine feet.

In the annexed plan is a main partition wall, across where the chimney is, from whence the joists extend 21 feet to the exterior wall.* The weight of extra-

T 2 ordinary

* In laying down joists, if a small chip or cleat be nailed on, near their ends, it would greatly strengthen the walls ; in holding them as a tie, and preventing their inclining either inward or outward. Short spurs of scantling may be fixed to the side of the joists next the wall, and extend into the wall with chips near their ends, for holding the side walls.

ordinary quantities of snow and sleet often repeated in the course of a winter, is to be guarded against. If there was no chance of omission to shovel off the snow every time it should fall, less strength would be requisite: but there probably would be neglect in this; or the house might happen to be uninhabited during some winter or other; I would therefore have the joists strong and numerous, and the joists immediately below those of the roof, should be made to bear some portion of the weight, by planks between the lower and upper joists; which are to be two or three feet apart, the depth of the space allowed for the external air to pass through and carry heat from under the platform roof, so as to cool the work and chambers, and admit a person to go between the platform and ceiling and examine defects.

Another objection is, that sudden changes of the weather between great heats and torrents of cool rain, are very trying. But it is pretty certain that attention in the choice of the materials and laying on the covering will be effectual in preventing such injuries; especially when relieved from much heat by the vent between platform and ceiling.

The stair cases in the above design may be best in the corner rooms, or the passages. To make these corner rooms otherwise than square, would give the house the appearance of an old castle, if rounded,
and

and of a modern fortress if the extreme angles were made at all acute ; which is to be avoided. It is in all things to support the character of a house, a mere habitation. Wood on stair cases may be coated over with a cement.*

Preserving the principles, and the form ; the size will be according to the ability and discreet views of the proprietor. In the annexed plan, the

	Feet.	Feet.
2 Passages are in the clear 21 by $9\frac{5}{7}$ each 200, both 400		
4 Rooms, the corners 12 by 12 144	576	
2 Ditto, . . 20 by 21 420	$8\frac{4}{7}$ 0	
		1816
Whole area		

The drawing is of an elevation and plan fronting south. The entrance is at either of the sides, east or west : and these sides need but little of window light. There are objections to balconies : but if desired, the east and west sides of the house may be preferred, for giving shade ; in the morning on the west, and in the evening on the east. The width may be $2\frac{5}{7}$ feet of the recess, and $5\frac{5}{7}$ projecting ; making 8 feet the width of the balcony.

Between

* Nothing is said of any use of the *flanks*, formed by the recesses of the exterior walls : though holes in them would effect some good in airing the rooms. Among a civilized people, and in a *country of laws*, there *ought* to be no occasion for any extraordinary application of them.

Between the ceiling of the uppermost story and the platform roof, is to be a clear space of two or three feet in depth, with holes through the opposite walls. The hot air will thus be carried off from the under part of the platform, and there will be a space for examining the state of it. The air holes in the walls may be 8 or 10 inches diameter, with wire or twine lattices well soaked in the tar and oil composition (page 285), for excluding birds; and during the winter, inside close shutters are to exclude snow.

A balustrade of plain bannisters squaring to 2 by 3 inches, thin side outward, and leaving clear intervals of 6 or 7 inches, will admit of snow being more freely blown off as it falls: otherwise a handsome close parapet of wall, would be preferable. Turned bannisters would not be so simply neat, nor admit of so much freedom to the snow being blown off, as these plain bannisters. Rope-netting or lattice would also admit of snow accumulating on the diagonal ropes and their angles.

Height: Basement elevation of the walls $9 + 1 = 10$ feet.

Second story,	.	$12 + 1 = 13$
Third story,	.	$9 + 1 = 10$
Vent space,	.	$2 + 1 = 3$
Whole height		— 36

In proportion as the walls are *high*, they should be thick and strong. The *three-story* house would have

36 feet of wall above ground. A two-story, 26 feet, and a one-story house 15 feet. So that if one story requires a wall 1 brick thick, two stories may have the basement $1\frac{1}{2}$, and three stories 2 bricks thick : or say $1\frac{1}{2}$, 2, $2\frac{1}{2}$ bricks thick, the basement or first stories. The foundation wall should be three feet in the ground, for gaining firmness and to be out of the reach of severe frost.

It may be sufficient for some families, and best suit their purposes to have but *one* or *two* stories of rooms. The lower the walls the stronger. It would be no great task to force water up, every evening in summer, for cooling the roof and other purposes. At Algiers, much of the women's work is done on the roof, where water is always at hand. They especially wash and dry their linen there. In Spain they have their cloacas on the platform roof ; where also are two cisterns of water : one for the use of the cook, the other for more common purposes, washing, &c.* From this the pipes of the cloacas are sluiced. At Cadiz, water is received into the cisterns on the tops of the houses, from reservoirs or heads of water on the hills out of the town. Water might be raised to a head at the top of Mr. Morris's quarry hill, on the

* In Oporto the *kitchens* are usually in the *attic story*. Murphy's Trav. So it is said, the kitchens are on the tops of many houses in Spain : either on the platform roof; or more probably in the attic stories.

the Schuylkill, for supplying reservoirs on the tops of the houses in Philadelphia.* Consult ingenious men. The tide falling eight feet ; and running $2 \frac{1}{2}$ ths miles in an hour, at least equal to the walking of horses in mill-work, could not works be so constructed that the impetus of the water of that river should move a wheel (I think a horizontal one) which would force the water wanted up to a reservoir, on the top of that hill ? A horizontal wheel under water would for ever turn one and the same way, whether the water runs ebbing or flowing ; as near thirty years ago I experienced in a model.†

The *basement* and *second stories* may be divided according to the views of the builder, rather than by the annexed plan ; pl. IV. The *third story* having the four square rooms, at the corners of the plan, thrown into closets about $2 \frac{1}{2}$ ths feet deep, will admit of the thin partition as above laid down, to be omitted ; and then the whole area (clear of the closets proposed) will divide into four roomy bed-chambers.

The

* With a quadrant level, I find that the upper part of the brick pedestal of Christ church steeple, is nearly level with the top of this hill : the observation taken at a station distant from both objects : about two miles from the steeple.

† From water forced up through pipes, every house might have *faucets* near the bed-rooms, which would be an important improvement for promoting the health and comfort of families. You now rise from bed and wash face and hands

The middle wall crossing the passages and dividing the large rooms, will bear most of the weight
on

—your tip ends. Why not rise and plunge into your wash-basoon—a bath adjacent to your bedchamber, instead of using a gallon vessel of water, only for hands and face? Every family in this climate ought to have its *bath*; and proper bathing places should be provided for servants also.

Bathing moistens, soaks, washes, supplies and refreshes the whole body. When the water is *tepid*, bathing is always safe, cleaning and refreshing; when *cold*, or made more than blood *warm*, it is wholesome or not according to the state of health; but it is very beneficial in many cases, when well advised to use the one or the other.

“ Among the rules for preserving cleanliness and a sound state of the skin, an important one is to *bathe once a week the whole year through*, in tepid water: and it is wished (says Mr. *Hufeland*, in Germany) that *public baths* were again erected, that poor people might enjoy this benefit and be rendered strong and sound; as was the case in former centuries; when on every Sunday evening, people went in procession through the streets, beating on basoons, to remind the poorer classes of bathing: and people who labored at dirty work, washed off in the bath the dirt which, undisturbed, would have adhered to them probably their whole lives.”
2. *Hufeland*.

In *Italy*, ladies sometimes use the bath before they dress; and therefore are capable of bearing the summer’s heat; and are better prepared for bearing the change of air in their ensuing winter. Their *chamber-baths* are very convenient.—In shape something like a cradle without a head, they have a

on the roof, and must therefore be particularly strong. The joists of the platform run from this wall north and south to the exterior walls.

The

handle at each end, and stand on four short legs, high enough to admit a chafing-dish under them ; so that they can have a tepid or hot bath whenever they please. It is made of copper well tinned within ; and being thin and portable, is easily carried from room to room. When used for medical purposes, the patient is easily laid in it. *Books on Italy*, p. 199. In some cases water is made *salt as the sea*. Those who use either tepid or hot baths, *medicinally*, put vinegar, brimstone, iron filings, and sometimes aromatic herbs in the water. The *sea bath* is inconvenient for sick persons in getting out of it.

In no situations are *baths* more necessary than in *prisons*. Wherever men are kept together in numbers, they are liable to contagious fevers breaking out amongst them. It is so even when they are less confined than in prisons. "In 1792 a contagious fever broke out in a regiment of soldiers quartered at Liverpool, England, and increased rapidly against all opposition, till by advice of the physician the regiment was drawn up, and the men severally examined by him ; when 37 were found to have the morbid symptoms ; and being drawn out, were stripped naked in the sick house, and had a full bucket of cold water thrown suddenly on them, severally ; which was repeated once or twice a day, and cured them in a few days. The whole regiment then bathed daily in the sea, (the water whereof contained one thirty-second part of salt.) In two weeks this practice, daily repeated, totally extinguished the contagion and fever." This cold bath (*the sea water*) was 58 to 60° of Fahrenheit's scale. When the bath is of fresh water, add one part of salt to 33 of water.

The recesses of the walls are shallow as may be; $\frac{1}{10}$ foot clear of wall will do. If deep, they retain or concentrate heat, and harbour mukketoos.

If the corner rooms be 10 feet sq. or $100 \times 4 = 400$ feet,
 The middle rooms 18 by 20 ft. sq. or $360 \times 2 = 720$
 The passages $7\frac{1}{2}$ by 25, or $187 \times 2 = 374$

Whole area 149+

Construction of chimneys to the best advantage is very important; yet, till lately, the principles have been

The like practice is applicable in hospitals and manufactories as well as in prisons.

Besides the usefulness of *baths* in cases of sickness in *prisons*, &c. they would at all times be refreshing, and tend to prevent the occurrence of disorders. At least the use of them would be cleansing and comfortable ; and for these purposes the *Germans* formerly used bathing amongst the common people of towns, as above ; and in great measure such bathing by sudden effusion or immersion, would supply the want of *exercise*, by the powerful and brisk action into which the muscles, fibres and nerves, would be thrown.

"*Cleanliness*, says *Hassar Imma*, is of the greatest importance to all animal life. All animals are subject to its laws. The means of it are always present. The limpid stream and the briny wave are appointed to this purpose. They purify the surface, and brace and strengthen the nerves and fibres of animals. The Destinies have thus proscribed *nastiness*, which is the source of many diseases ; and is loathsome and detestable to human nature, and to most animals."

been but little understood. Mr. Peale, of the Museum in Philadelphia, has given me some account of the fine effects of his patent improvements, and says, that "fire-places which were used to smoke, on his principles are cured of smoking; and such entire command is had of the draught of air, that with but little of attention to the state of the fire, as to its burning clear or not, by moving the sliding mantle downward for increasing the draught, then returning it for letting the heat into the room, and closing the valve or register in the throat of the chimney, just far enough for carrying off the watery particles of the fuel, only a small portion of the heat is suffered to escape up the chimney: consequently with very little consumption of fuel, even large rooms may be kept comfortable in the coldest seasons, as during the last winter he continually experienced; and the house is perfectly secure from any fire left in the fire-place at night."

I have in the late winter seen one of Mr. Peale's fire-places in its improved state, where the room was uncommonly large, 26 by 25 feet square and 15 feet high. On inquiry, it was ascertained to me that during the winter only small fires were kept burning from the morning about seven o'clock till nine or ten at night, when it was let go down, and the mantle of the fire place, and the valve or register of the chimney flue were closed, or very nearly, and the family left the room to go to bed; that

it

it preserved a warmth, not less than 48 of Farenheit, in the room till the fire was renewed next morning; and this was the case in the coldest nights, when out of doors the thermometer was at 10 degrees. That in the day the heat was steadily kept at 60 degrees. There is, next door to mine, a fireplace very noted for smoking. After many vain attempts to cure it, it was closed up with brick-work, plastered over, and so remained till lately, when Mr. Peale directed his improvements to be applied to it. Now it is perfectly free from smoking in the very worst of winds and weather. What further proved to me the due portion of heat having been steadily preserved in Mr. Peale's above room, during the winter, was the high perfection in which, in March, I saw in it a collection of green house-plants, oranges, &c. that had stood there the winter through. The room had two windows fronting westerly, and two southerly, and I never saw green house-plants more perfectly kept.

CELLARS AND APERTURES IN HOUSES.

It is a general practice in America, in building habitations, to have many windows; and to leave them *open in hot weather* for letting in the common air. When in such weather there happens to be a breeze, some benefit is received by the few persons who can sit close to the window. But as the air

from

from without when the sun shines, is full 20 degrees hotter than within doors, the air looked for brings with it that increase of actual heat: yet concentrated in a stream as it rushes through the windows it relieves persons on whom it strikes, with sensations of coolness. But if the house is *shut up* during the hot sun-shining part of the day, the family feels more coolness and comfort than when the windows are open for letting in the wind which is actually hot—and how is it in the time of a calm? The having only *a few apertures, in habitations, is advantageous both against cold and heat.*

Cellar windows are improperly left open during the whole time of the hot season, for letting in cool air: when in fact the air let in is heated above 20 degrees more than the nearly quiescent air in the cellar.

The following attentions would be preferable to the common practice. *Shut up the cellar* during the hot season, from May till October, *night and day*: or open the windows after the setting of the sun, and close them by sun rise, *if it be a wet cellar*. From the first of October the windows may be *left open*, day and night, till the end of November, or threatening of a spell of freezing weather: then again *close them*, till about the 20th of March or early in April; when the windows are left open, till

till May, as above. Yet, during winter, a few small air holes may be left open immediately under the joists of the first floor, for preserving some degree of motion, as the life of air, and for a passage to musty vapours of the cellar. The less the cellar, under habitations, the more healthful the family. For a few purposes a small cellar may be here. For other purposes have them under some detached building.*

ICE

* In five successive days of June and July, I found the medium mid-day heat of *clear days* was $21\frac{1}{2}^{\circ}$ more out of doors, ten yards north of my house and 5 feet above the ground, than in a recess in a N. and S. passage running through the house. When *cloudy*, the heat out of doors, as above, was only 3 to $5\frac{1}{2}^{\circ}$ more than in the passage. But, these experiments having been made in a thick built town, are less satisfactory than if they had been of heat in the country, where its effects are much more extensively felt, by husbandmen, labourers and travellers. In such a niche or other shaded part within doors of a house *in the country*, observe the degrees of heat; and also at five feet above the ground (the thermometer hanging clear of what might add to its heat) of an open field or main road.

In July, when in doors the heat was 80° , in the back yard north of the house in the sun-shine it was 100 at five feet above the ground, and at the south door 105° nine feet above the street.

ICE HOUSES.

Ice is applicable to economical purposes in hot weather, especially in country families.*

In 1771, I built an ice-house in the peninsula of Chesapeak, where the ground is flat and the surface only seventeen feet above the high water mark of a salt water river, and 80 yards from it. It was constructed

* "I never was in better spirits than here in this hot country (Sicily). I believe the quantities of ice we eat, in ices, contribute to it; for I find, in a very violent heat there is no such cordial to the spirits as ice, or a draught of iced water. Its cold braces the stomach, and gives a new tone to the fibres. I knew an English lady, at Nice, soon cured of a threatening consumption, by a free indulgence in the use of ices."—Probably attended with internal bleeding; which it is said cucumbers, cold in their nature, have cured. It is the common practice here, Sicily, to give quantities of ice waters to drink in inflammatory fevers." *Brydone.* But great caution is to be observed that it be not drunk when you are warmed at all by any kind of motion: much less when you are in a heat from exercise.

"The custom in Sicily and Italy of taking ice, is considered as a powerful remedy in many diseases. The physicians of these countries do not give many medicines; but frequently prescribe a severe regimen; and prevent the baneful effects of various diseases, by suffering the sick, for several days, to take nothing but water cooled by ice, sweet oranges, and cold fruits." *Stolberg.*

structed with great care to prevent entrance of air, according to the then universal practice; and it was filled with 1700 solid feet of ice, the pit being 12 feet square and 12 feet deep: but it failed of keeping the ice till summer, because of its moisture and closeness. When the pit was dug it shewed some appearance of moisture near the bottom: the least moisture is too much for an ice-house. Moisture at the sides or bottom of an ice-pit, is raised to the inside surface of the dome by a heat which, in the deepest pits that can be dug, is much above the freezing degree, and if the pit be close it recoils on the ice for want of a vent. If the close pit is not frequently opened it becomes very warm, and the ice is soft and pappy at the top. The deepest and coolest pits are about twenty degrees warmer than the freezing point: so that no depth of a pit can preserve ice from melting. It is from a greediness for depth that we too often meet with *damp* earth.

Some years afterwards, I made another ice-house, 150 yards from the above mentioned, on the principles and in the manner following: *vent* was an essential object; and *dryness* with *coolness* led me to the design of insulating the mass with a bed of straw surrounding a pen of logs which was to contain the ice. The pit was dug on a spot open to wind and sun, for the sake of dryness. It was 9 feet deep. Within it was the pen of logs, of that depth, and 9

feet square in the clear. It contained but a little more than 700 solid feet—only half the quantity stored in common ice-pits. A house was over the whole; rather for excluding rain than air. The sides of the house were 5 or 6 feet high. The eaves were boarded up, but not close, and the principal vent was at the top of a pavillion roof.

Straw is a considerable resister or non-conductor of heat. Let it be clean, sound and dry; and lay it close between the logs and bank, with an abundance of it upon the ice. The small mass of ice stored in the above insulated pen, 700 feet, was daily used of very freely, and lasted near as long as double the quantity stored in a close ice-pit as commonly constructed, and which is on the hill in Union street, Philadelphia; the earth, whereof is dry and gravelly from near the surface down to the bottom.

In plate V. is a section of this insulated ice-pit. The pen or cell inside of the logs, is 11 feet square, 11 feet deep, whereof $5\frac{1}{2}$ are under ground and $5\frac{1}{2}$ above ground, and it contains 1330 solid feet. The space between the logs and the bank, at bottom is near one foot; the same at top is about 2 or $2\frac{1}{2}$ feet. The sink for receiving water from the melting ice need be only 5 or 6 inches deep if it be good ground, and 8 or 9 feet square. Logs are laid across it. An ice-pit of 1300 solid feet, if insulated as above,

I believe would keep more ice than any private family could want ; supposing the pit is not deep, and the ground is dry. If 1300 feet of ice should not be sufficient, in another year heap upon it a foot more in thickness ; and so foot upon foot, as may be requisite. These additions are above ground. Ice, in ice-houses, melts more at the bottom and sides than on the top ; unless it may be otherwise in very close pits seldom opened. A pen of eleven feet cube, requires a house over it of only eleven or twelve feet square.

The winds most injurious to ice are from the *south* to the *east*. The door being on the *north* side, needs no passage. Rats are to be guarded against. The eaves are to be closed against them : but openings may be left on the north side, at the eaves, for admitting the steam to pass out, there as well as at the common vent on the top of the roof. These openings may be from lattice work in wood or wire : or a plank may be projected below the opening, and beyond the reach of rats.

All the building materials are to be on the spot, ready to be put up as soon as the pit is dug, lest rain damage the pit before the house can be covered.

Pound the ice small, and prefer to store it in keen weather. In such weather a neighbour dashed water

on his pounded ice, a pailful or two to each cart load, as soon as it was stored and pounded, load by load : and he informed me it answered well, in closing and cementing the mass.

Ice-houses are to be left open some time, till dry, before filling them with ice. When the house is to be charged with ice, first lay *small faggots* on the grate ; and on these *reeds*, rather than straw as is common. Corn or maize stalks are very spongy, and holding water seem improper. The *thinner the ice*, the easier it is *broke to powder* ; and the smaller it is broke, the better it will unite into a close mass. — *Ram* the ice close as possible in its place. Count Stolberg, says in Sicily they prefer *snow*, as it is more easily preserved than ice. The snow is closely packed together, and covered with straw.*

INTIMA-

* January 1797. Viewed the ice house at the tavern, on Gloucester point near Philadelphia. It is built within a few steps on the north side of the tavern, and near the margin of a drained low meadow of some miles extent, and of the river Delaware ; but a few feet higher than the meadow and river. It was dug 5 feet deep (seemingly 3 feet too deep). Then filled up 2 feet with logs, and straw upon them ; leaving 5 feet of ice under ground ; and about 6 feet above ground, the ice inclosed in straw ; which also is a lining to the house of slabs, covered with a slight roof of slabs. It was then full of ice, in pieces the size of small apples. Sixty-one loads of a one horse cart filled it. In the year preceding 27 such loads supplied the tavern with ice till some time of August.

INTIMATIONS;

On Manufactures ;—on the Fruits of Agriculture ;—and on New Sources of Trade, interfering with Products of the United States of America in Foreign Markets.

The countries of Europe abounding in manufacturers and sailors, and superabounding in soldiers and ministers of religion, buy bread from other countries ; chiefly from *Poland, America and Barbary* ; and, generally, the countries which sell some, buy more than they

January 1798 I again saw this ice house ; and was assured that the 61 loads kept through the summer, and that “some loads of ice were in it when ice came again.” The only way into it is by a small door, about $2\frac{1}{2}$ feet square at the gable end into the roof.

July 5th, 1799, Mrs. Marshal assures me, her ice kept in this ice-house through the last summer, 1798, and until the Delaware was frozen in the last winter. It is astonishing ! Ice keeps not so well in the pits in the high grounds in Philadelphia. Many people view her ice-house ; and admire at the keeping ice in it so much better—almost in a drained meadow !

Above, *Straw* is spoken of as being a considerable resister or non-conductor of heat. The Annals of Chemistry, vol. 26, Fr. as cited by Tillock’s Philosophical Mag. 2, pa. 182, says, “It is well known that *charcoal* is one of the weakest conductors of heat.” Hence the thought of *double walls* for filling the intermediate space with *charcoal* ; and he applies the

they sell. The bread country, *England*, buys more than she sells ; and, at the same time, it is a happiness to her that she is superior in the number and the excellency of her *manufacturers* ; who, with her *sailors*, are the more desirable mere *consumers* of bread, giving support to a constant good market, *at home*, for the corn, the meat, the wool, and generally all the productions of her land ; so that *England* abounds in the necessaries and comforts of life, within herself, from a well proportioned employment of her farmers and tradesmen, who mutually supply each other's wants : and she furnishes foreign countries with a prodigious overplus of the fruits of her manufactures and commerce ; which has rendered her rich, powerful, and less dependent than other nations. The fifty or sixty ship loads of wheat which she buys more than she sells, are inconsiderable when compared with the great profits of her immense commerce and manufactures. The yearly buying more bread from abroad than she sells, assures to her husbandmen a constant demand and full price for the corn produced

idea to “ice-houses *above ground.*” He adds, “at the *same heat*, a body inclosed in charcoal does not receive but about two-thirds of the heat of a body surrounded by quartzeous sand ; and that the reduction of subjects which do not melt but at a heat of 130 degrees, cannot be effected in *charcoal.*”

As often as the river tides are high its water oozes into the ice pit ; a pump is therefore at one corner of the house, for freeing it of the water,

duced by their lands ; and this is a great encouragement to a vigorous cultivation of them ; as it gives an income to the industrious countryman, independent of uncertain demand by foreign countries.

A statute of the parliament of Great Britain, of no long standing, compels the most minute entry to be made in the British custom house, of every sort of corn, as well what is imported as exported. The first report made to the parliament, under that statute, was of the first eight years after it was in force ; by which it appears, on a medium of the eight years, that there were *imported* into *England* about 600,000 bushels of wheat yearly, more than were exported—near 60 ship loads.*

• *Poland* and *America* import no bread. For want of numerous manufacturers and sailors, the most useful consumers of bread, who make none, they have not a demand at home for one half of the produce of their lands : they therefore export great quantities ; *America*, especially, depending thereon for supplies of clothing and other comforts : which she
might

* This is here stated from memory. It is hoped it is not materially, if at all erroneous. That there is a deficiency of corn produced in the united nation of England and Scotland, we are assured by a subsequent report of a committee of the Lords of council to their king, on a bill then before the Parliament ; in which it is declared, that “ Great Britain is not able to supply itself with bread, without aid from other countries.”

might soon, in a great measure, manufacture within herself. Ought she not, therefore, to prefer it to a dependence altogether on foreign countries?

Somewhat has been said, in public, of manufactories in *America*; whether it be advisable to promote them in this early stage of her political existence, or to depend on procuring goods from other countries, with the produce of her lands? Have we not “room for looms and the various arts?” Why then should not this nation, in its present youthful vigor, begin to apportion her employment between husbandry and manufactories? which in experience prove to be so coincident, so promotive of wealth and independence, as to have rendered *Britain* rich in all comforts, with a purse powerful in war; but which some on both sides of the Atlantic think has unwarily admitted of a degree of pride in her, that, according to what is common to that vice, bodes an approaching reverse in the current of her affairs. Besides, in the course of a great influx of emigrants to *America*, many, if not the greater number, are mechanics. When these land on the sea coast, and find little or no employment for them in the way of their profession, will they generally go to country labour? Past experience says they will recross the Atlantic, or travel farther westward, and sit down on lands easier obtained, and where they can live on less labour than they could among the old settlements in the hither country.

But

But if manufactories were on foot among us, it would be natural that they should generally prefer the employment they had been used to ; and by fitting down to their trades, they would gradually advance the arts in America, whilst the more rapid increase of husbandry would be the means of supplying them with bread in payment for their goods, and leave an overplus to be exported to foreign markets. “ It however is material to the vigor and worth of manufactories, that they be not dispersed. They are more or less advantageous, according as they are carried on in towns, or in detached habitations in the country. In general, the manufacturer in the country has his farm, or a lot of ground, which divides his attention with that of his shop, whereby both crafts suffer ; and certain it is, says Mr. Young, their husbandry is always execrable—the shop and the field are conducted with little spirit : both are mean in the quantity and the quality of the productions ; and the living of the *farmer-tradesman* is according to it. But in towns the trade is alone depended on, and the productions are more and better : so of the *thorough-farmer*, from whom he buys his bread, and to whom he sells his goods.”

When our employment shall be duly apportioned between husbandry and manufactories, the comforts of life will be certain ; as they will be procured within our country, independent of the caprice of foreign countries :

countries : with the overplus of these we are to obtain exotic delicacies, luxuries, and bullion.

" From well chosen employments are derived the riches, the strength, the independency, and the happiness of nations." If the employment be in things necessary and convenient, it is infinitely better than when applied in producing luxuries. With necessities plentifully produced at home, we may be independent of other nations. An absolute independency, which shuts out commercial and in effect social intercourse, is not meant. Nations do not all yield the same productions ; and few, if any, properly divide their employment between husbandry and manufactories. Britain is the nearest to it. Even where the best proportion prevails, luxuries and trifles will have some share of attention among the artists, although common sense directs that, especially for the interests of a young country, the first and principal application should be to procure *necessaries* as well for *staples of commerce* as for domestic uses ; such as food, clothing, ammunition, &c. Yet legislators will not over busily warp employment against its natural bent. They may invite and gently incline it ; avoiding dogmatical inhibition or command, unless it may be on very extraordinary national occasions. Nor will they erect monopolies, directly or indirectly, or give undue preferences. Temporary patent rights for

for inventions are not meant.* To set about making fine goods before we are full of *necessary* comforts, seems a beginning at the wrong end.

The manufactures wished to be first promoted are especially of plain *clothing and blankets, arms and ammunition*. Manufactures of *woollen* goods are full in our view—In promoting these, we increase the quantity of meat and skins as well as of wool. They are not exotic; but precious materials furnished by our husbandmen. A bounty on the exportation of arms and ammunition *made within the nation*, would soon cause those essentials to abound in the country for its necessary defence. Yet it is in a spirited and flourishing *husbandry* that the soundest health and comfort of nations is found. It is a *plenty* of food and clothing, plain and good, rather than fine things, which gives content and cheerfulness to a people; and it is the great mass of the people that are industrious, rather than the idle poor or the luxurious few, who are principally considered by legislatures.

What if to the bread wanted by some countries, which is at present supplied by *Poland, America and Barbary,*

* Perhaps it were better to grant *rewards* proportioned to the usefulness of discoveries or inventions, than *exclusive* patent rights. There are considerable objections to the latter, in experience, however fair it stands in theory; and infinite advantages would arise from an immediate free use of the invention, at large.

Barbary, one or two great additional sources of it should be opened? How would the husbandry and the income of our country be affected by it? Would there not be then felt a want of manufacturers, consumers of bread who make none, yet who would preserve the value of the produce of our husbandry by such consumption, and furnish other necessaries and comforts from their various occupations? There is reason to believe that yet a little while, and the productions of the countries on the *Nieper* and the *Danube* will rush through the *Straits of Constantinople* into the *Mediterranean*, and thence into all *Europe*. The wheat of the *Ukrain*, hitherto shut up by the *Turk*, sells at 1*s.* to 2*s.* sterling a bushel. The countries so shut up also abound in cattle, hemp, tobacco, &c. which are to be conveyed through these straits to a market new and important to those countries; which articles will greatly interfere with and cheapen the produce of our country. The *Banat* is said to be by far the cheapest country in *Europe*, in all necessary productions, meat, bread, wine, fruits, &c. The culture of *rice* was introduced there by the late Emperor with great and increasing success. Prices in the vicinity of *Tybisicus* river are in sterling, as follow: * wheat at 17*d.* an English bushel; rye 12*d.* barley

* The *Tybisicus*, or *Teisse*, is a large river, which takes its rise in the Carpathian mountains; passes by Tockay through Hungary, and falls into the Danube above Belgrade. The *Banat* is the country of *Temeswaer*.

barley 7d. $\frac{1}{4}$; hay in towns, 10*s.* a ton; in the country, 3*s.* a lean ox 40*s.* to 50*s.* a cow 30*s.* to 45*s.* (cattle are dearer than grain, because they are readily driven to market: they are driven by thousands annually, from the *Ukraine*, through *Poland* into *Silesia* and *Germany*) mutton, 1*d.* a lb. beef, from 1*d.* to 1*d.* $\frac{1}{2}$; pork, 1*d.* $\frac{1}{2}$, to 2*d.* wine, 45 gallons new, in a good vintage, 7*s.* to 42*s.* according to quality; rent, 2*s*6 to 4*s.* the English acre; and all this cheapness we presume is owing to the want of a passage through the straits of Constantinople, to foreign markets—the very markets hitherto supplied by *Poland*, *America* and *Barbary*.* The *Turk* is to be forced by the *Czarina* and the *Emperor* to suffer a passage through

* “The clogs to the exportation of the produce of *Hungary*, is an evil continually galling individuals. Wherever I went (says Mr. *Townson*) I was led into cellars full of wine, and into granaries full of corn, and I was shewn pastures full of cattle. If I felicitated the owners upon their rich stores, I heard one common complaint—the want of a market, want of buyers. Wine bought in *Hungary* for 133 cents, has an additional expense on it of 177 cents, in all 310 cents when it reaches the port of *Trieste*: and the corn bought for 44 cents, an expense of 133, both 177 cents at *Trieste*. The raw produce, unmanufactured, which *Hungary* exports, are cattle, hogs, sheep, goats, metals, minerals, flour, wheat, rye, oats, linen, woollen cloth, wine, wool, wax, potash, salt, stoneware, tobacco, flax, hemp, feathers, fish, skins, leather, furs, tallow, soap.” The above sums in *cents*, are the value of the sterling money in the quoted passage.

through those straits : it already has been of late nearly accomplished.

You say the above events are problematical, or at a great distance of time : but there is one of a different nature and very influential in the argument which is more certain and nearer at hand. With the improvements in government, which the philosophical spirit of modern times is producing, the condition of mankind will be bettered, and in no circumstance will it be more perceptible than in their greater skill in all the arts, as well in agriculture as others. Then will *France* be fully equal, to supply her own demands for wheat, and *Spain* and *Portugal* will be so in no long time.

Another new source may be in *India*. Sugar has not become a common article from that quarter till lately. When in 1792, it sold there 15*s.* or 18*s.* near four Spanish dollars a hundred, it was sold 50*s.* to 60*s.* in London. A sudden and till then unknown demand for sugars by Europe and America occasioned an increased price in India : and the demand having continued and increased, has stimulated the *Indostans* to increase the culture of sugar canes with great spirit, for supplying *Europe* and *America* with sugar. The *Calcutta* gazettes are full of the designs of planting and cultivating the sugar cane : and now we are assured by some of our countrymen, who have been lately

lately in India, that the *wheat* of that country is very fine, and is sold at 11*d.* sterling for an English bushel. If then their sugar makes a freight and a profit when carried to Europe, so may their *wheat*; provided it should bear so long a voyage. It would sell at above 500 per cent. when their sugars would scarcely obtain 300. But will the bulk and price of wheat admit of a freight and profit sufficient for the adventurer? Mr. Law, in his sketches of arrangements in *Bengal*, for the year 1789, says it would clear 50 per cent. "I saw, he says, much extended cultivation and increasing population through *Bengal*: but there is some apprehension of a want of consumption; grain selling in some places 100*lb* and upwards for 12*d.* sterling, (equal to 7*d.* $\frac{1}{3}$ a bushel of 60*lb*) *Wheat* might certainly be exported from *Bengal* with great success.—It would be shipped for 7*s.* 3*d.* sterling, the English quarter which is under 11*d.* a bushel. At 5*s.* a quarter in London, it would yield 50 per cent. profit on cost and charges of freight," &c.

Although wheat from India should not always bear the voyage, yet the flour of it, which is very fine, might. Flour carried from the *Delaware* to the *Ganges*, proved perfectly good when returned from thence to *Philadelphia* in a late voyage. But if neither their wheat nor their flour could be carried to Europe in good condition, yet their *rice*, the common bread of the country, could. It usually is very cheap;

cheap ; and whilst their labour is but 2d. sterl. or 37 mills a day, all the fruits of that labour will continue to be cheap.

Whether the great sources of the countries on the *Nieper* and the *Danube* shall soon be opened or shall not, there is at present such an apparent probability of it as may induce us farmers to consider in time how we are to avert the threatened ill effects of a change that must be as sudden as important. The farmer of flashy ostentation may especially think of retrenching wasteful habits : and whilst legislators may wish that labour be apportioned between husbandry and manufactures, and gently promote it, they will be cautious how they favour the one at the expense of the other.

In the *Ukrain* and *Poland*, and on the *Danube*, labour is cheap, whilst with us it is the highest in the world. When we shall have driven the Indians from their country, what will be the condition of the people of the hither states, respecting labour which already is so much drained from them by the ultra-montane country ? This will not immediately affect all the states ; but it soon may, and who can say how soon it will not.

POTATO SPIRIT; AND BEER.

What is called Irish-potato, as if derived from Ireland, was first found in *Peru*; and might therefore be more properly called *Peruvian-potato*, according to Mr. Romans: or globe-potato, from its shape.

Doctor Anderson, of Scotland, gives an account of an extraordinary spirit which he procured from this potato.

In February he boiled to a soft pulpy state, a bushel of them weighing 72^{lb}:* then bruised and passed them through a strait riddle along with spring water, keeping the skins back, in the riddle, and throwing them away. Cold water was added to the pulp, and mixed up till the whole mixture was 20 gallons. It stood till cooled to the temperature usual for applying yeast to wort. Yeast was then mixed with it as if it was malt wort.

In 10 or 12 hours a fermentation began, and continued very briskly 10 or 12 hours; and then began sensibly to abate. It was now *briskly stirred*, and the fermentation was thereby renewed. The same operation, as often as the head fell, was renewed every day; and the fermentation continued for two weeks. It then abated, and could no how be further kept

X

up.

* In common a bushel weighs about 61^{lb}.

up. The liquor had by this time obtained a kind of acid slightly vinous taste.

It was now distilled with due caution : care being taken to *stir* it in the still, *until it began to boil* before the head of the still was put on ; and the fire was afterwards kept up so strong as to keep it *boiling briskly*, till the whole was run over. This boiling prevented the thick matter from subsiding to the bottom and being still-burnt.

“ In consequence of these precautions and due
“ rectification I obtained, says Mr. Anderson, an
“ English gallon of pure spirit, considerably above
“ proof, and about a quart more of a weaker kind,
“ a good deal below proof. It was in every respect
“ the finest and most agreeable vinous spirit I ever
“ saw. It was somewhat like very fine brandy :
“ but was milder, and had a kind of coolness on the
“ palate peculiar to itself. Its flavour was still more
“ peculiar, and resembled brandy impregnated with
“ the odour of violets and raspberries. A single glass
“ of it put into a bowl of rum punch gave it a flavour
“ of half rum, half brandy impregnated with rasp-
“ berries. There was no difference in the taste of
“ the very weakest of its spirit, near the end of the
“ distilling and that of the first ; which is a great
“ peculiarity.”

The

The white pulp at the bottom of the still is, he says, every way applicable to domestic uses ; for the table or for live-stock, as the whole potato is. But might it not, under some circumstances, be better applied in producing starch ?

In the first week of *August* 1790, I made an experiment, according to Mr. Anderson, for procuring potato spirit, from potatoes then gathered for the purpose, from vines not dead, but only beginning to be yellowish. But in several attempts could never get the mash to ferment. The failure seemed owing to the potatoes being not *perfectly matured* ; and maturity is always an essential for obtaining a vinous fermentation from vegetables. There also seems to be another reason for the failure. Mr. Anderson made his experiment in *February* ; a spring month, when doubtless his potatoes were considerably *sprouted* ; and so far were malted. Grain is purposely sprouted, prior to fermenting it for making beer or for distillation ; and in Maryland these potatoes spontaneously sprout and grow in *February* and *March* : so that had I in either of these months chanced to have made the experiment, it would without doubt have succeeded.

Mr. Anderson's candour and habits of accuracy are eminent ; and leave no room to doubt that as he actually procured the fine spirit in the way above

stated, the like may be again produced, by the like attentions.

I cannot express my sense of the ruinous habits in a free use of drinks made from distilled spirits ; which are seen to debase and destroy very many men, and even some good men on whom the practice has stolen. In country families they are used with a freedom astonishing to strangers, who have been accustomed to observe a more temperate conduct, and are in the habit of drinking mild beer. In our large towns beer is taking place of diluted spirits ; which is a reason why there is more sobriety now observed in the towns than formerly, when West India rum abounded at a third of its present price. Country people pretend they know neither how to get malt or to brew it. This is not generally true. Malt is to be had at country malt-works, in the more provident states ; and maltsters can easily be drawn into the counties of other states, if country gentlemen would in good earnest hold out proper encouragement. Every housewife knows how to brew, somehow ; and would improve in it from practice.

It is better to buy malt, or exchange barley for malt, than to make it in families ; and not every farmer has conveniency for making it with ease. The principal difficulty I found, was in the *heats* of the malt whilst growing. Finding no one to instruct me,

in

in many attempts I failed from giving too much heat : for, seeing it feeble in growth, it was thrown into more heat, and thereby stopt in its power of further vegetating. Till at length I succeeded, on applying the heats given by Mr. *Mills* in his Husbandry.

In Mills's Husbandry, vol. 5. are good instructions for making malt, and beer. The heats in the malt whilst on the floor, were all that I wanted of him. These he gives, thus : During the first ten days that the malt was on the floor, the heat in it was between 50 and 60 degrees. During the next three or four days, it was increased from 60 to 65 and 67 degrees ; and during the last days of its lying there, to 80, 84 and 87, which last was the degree of heat when the malt was put on the kiln.*

In country families the good wife would delight in brewing beer for her husband, to take place of the mad, mischief-making and, in the end, debilitating

* Great loss and inferiority occurs in America from the hasty manner in malting. In England a statute obliges maltsters to work their malt *three weeks*. Such deliberate work renders the malt perfect. The English laws also prohibit all use of sugar or molasses in brewing, because of the duties on malt. Yet I suspect, from taste and observation, that the porter formerly so in vogue, and so excellent, called *Ben. Kenton's*, had a good share of burnt sugar or molasses in it. How the sugar could be smuggled into that porter, can scarcely be accounted for.

ing and ruinous brandy or spirit beverage. The truth is, drinking beer is not a fashion of the country. Vile habits bear down all prudence and every rational practice that is recommended by the experienced sober friends of mankind.

Whilst spirituous liquors continue to be used in drink, the mildest and best ought to be preferred. Of these the potato spirit seems the least *caustic* of any of the home made spirits. By drawing the spirit wanted from *potatoes*, the culture of that root is encouraged, grain is saved and the best *preparation* of the soil for future crops is increased.

During most of the revolution war my reapers had the choice of small beer or water to drink, after an uninterrupted long use of rum. The beer had body enough to preserve their strength and a due share of cheerfulness, without ever setting them wild as had been not uncommon under the use of rum. At the end of harvest there were no complaints of soreness and want of rest: but they continued cheerful and easy, and expressed a preference in favour of beer. This beer was brewed, enough of it, just before harvest. I never met with a servant, black or white, who did not like it; and for the most part, excepting confirmed sots, prefer it to rum. Generally, when I have asked poor travellers

lers and messengers whether they would have a drink of beer or a dram of rum, they preferred beer.

Our country is favourable to the production of hops: and they grow wild. It would be a good article to cultivate for the market, if labour was plenty for gathering entire fields of them. Hops are best cured by fire, as is tobacco; and like tobacco, when cured they become dry and friable or moist and tough, with the changes in the atmosphere: as they pass from the moist state to the dry, a portion of their active qualities is lost in evaporation: therefore it is proper to pack them away, being thoroughly cured, the first time of their being "in case," as tobacco planters would call it: that is when they will bear pressing in the hand without being too dry or too moist or high in case.

I am not recommending hops as an article of crop for market, generally. But there are husbandmen so circumstanced that, to them, it would be a profitable choice. Every farmer, however, would do well to cultivate 50 to 100 hills of hops, for having at command an article so essential to the making good beer when may hap he shall wish to introduce the most excellent beverage in his family: an article conducive to sobriety, health, vigor and contentment. If however he meanly gives way to an impulse that shall unfortunately continue him in the use

use of an unwholesome, debilitating, mischief-making choice of distilled spirits in his drink, then his 50 to 100 hills produce of hops would annually put 20 to 40 dollars in his wife's pocket; who probably would have the care of those few plants in her garden.

In England, great preference is given to a kind called *Farnham hop*. It is there a surer crop than other sorts. The crop is not only always greater, but is of a quality that gains a considerably higher price than other kinds. This hop was introduced into Maryland by that pattern of manly virtues the late Col. *Sharp*, when he was governor of Maryland. Some of the roots he gave me; of which I planted 250 hills: and at the same time and place near 600 of a much admired hop, called the large white hop. The soil, against appearances, proved to be extremely unsuitable. The white hop in five or six years scarcely gave ten pounds weight a year. The Farnham, few as the plants were, gave five times as much. The plants of the former were always excessively rusty or mildewed: those of the latter were much less so, and ripened the fruit twelve days sooner than the former.

The following method of brewing is compared with the old or common method.

A Tripartite

*A Tripartite Method of Brewing.**

1. Water is put into the kettle, division A. and heated.
2. The malt is spread in the division B.
3. The hot water is pumped or poured over, from A. to C. where it spreads over a perforated bottom; and falling every where on the malt in B. washes out its substance, through another perforated bottom into A. The perforated bottoms are moveable. This operation is repeated, with now and then stirring up the grains, and then, without stirring the grains, till the liquor is clear. The liquor is then made to boil briskly, from hence it is let into coolers.

The old Method of Brewing.

1. The kettle is filled with water; which is then heated.
2. The mash vat is charged with malt.
3. The hot water is removed from the kettle to the mash. It there remains some time, and then
4. The

* Tripartite, because the kettle apparatus is worked in three divisions. A Swedish method of brewing in camp, afforded me the hint for this invention. See the dimensions, &c. in the Explanation of the plates.

4. The mash is a long while stirred up with paddles : it stands some time afterwards, and then
5. The wort is let out very slowly into the underback or vat : a lengthy operation.
6. It is again returned to the kettle and boiled—and thence into coolers.

Mr. M'Cauley, in Front street, Philadelphia, made my tripartite copper ; which see in plate III. fig. 1.

DIET IN RURAL ECONOMY.

Count *Rumford* has made many experiments on diet ; and has written a book recommending the best choice for labourers. His book is not now in my possession : but as Doctor *Lettſom* has since published on the same subject, below are a number of messes selected from his book of “ Hints designed to promote Beneficence, Temperance and Medical Science ;” published in 1797.

Doctor Lettſom observes, in general, that *pies* are more advantageous than roasting or boiling. This he illustrates. Of mutton, 64 ounces in a *pie* made with 24 ounces of wheat flour, and eaten with $8\frac{1}{4}$ ounces of bread, in all $95\frac{1}{4}$ ounces, dined 8 persons fully : whilst 60 ounces of mutton, *roasted* and eaten with

with 33 ounces of bread, in all 93 ounces, dined only 5 of the same persons.

1. Milk pottage (thickened milk) he says, is more salutary than tea and bread and butter ; and made thus, is preferable to milk alone ; equal quantities of milk and water, are boiled up with a little oatmeal ; which breaks the viscosity of the milk, and probably is easier digested than milk alone. Oatmeal is a warmer nourishment than wheat flour, and agrees with weak stomachs.

2. Of boiling potatoes he says, in Ireland and Lancashire potatoes are boiled to great perfection, and then are used instead of bread. The potatoes being good, are to be nearly all of the *same size*. The large and the small to be boiled separately. Wash them clean, without paring or scraping. Put them in a pot with *cold* water ; not so much as to cover them, because they will add to the water from their own juices. If large, as soon as the boiling begins, throw in some *cold* water, and occasionally repeat it, till they are boiled through to the centre : they will otherwise crack and burst on the outside, whilst the inside will not be enough. Whilst boiling, add a little salt. The *slower* they are cooked the better. Pour off the water and place them again over the fire, for evaporating their moisture, that they may become dry and mealy. Serve up with the skins on.

Steaming

Steaming them is very inferior to boiling or stewing in water, as above.

3. POTATO PUDDING. *Lettſem.*

12 ounces of potatoes, boiled, skinned and mashed

1 do—fuet

1 do—milk, that is, 2 spoonsful

1 do—cheese. Mix all together with *boiling* water to a due consistence. Bake it. Instead of cheese, there may be an ounce of red-herring pounded fine in a mortar.

4. POTATO BREAD. *Parmentier.*

Crush and bruise potatoes well, together with prepared leaven (or yeast) and the whole flour designed; so that $\frac{1}{2}$ be flour, $\frac{1}{2}$ potato. Knead all up with warm water added. When the dough is enough prepared, place it in the oven *less heated than usual nor shut it up so soon as is common*; but leave it longer in the oven. Without these precautions, the *crust will be hard and short, while the inside will have too much moisture*, and not be soaked.* When potatoes are to be *mixed with dough of flour*, they are to be made into a glutinous paste; for giving tenacity to the flour of grain. A small portion of ground rice answers, and makes it eat shorter.

5. Potato-

* See *Lettſem*, p. 404.

5. *Potato bread*, in England. A skillet of potatoes with *cold* water is hung at some distance over the fire, that the water may *not boil* till the potatoes become *soft*. Then skin, mash and mix them with their weight of wheat flour, and also with the yeast, salt and warm water wanted. Knead all together. Lay the mass a little while before a fire, to rise ; then bake in a *very hot* oven [Parmentier in the preceding page is directly contrary.] Flour of rice or barley may be used instead of that from wheat.

6. Another English mode says : after long boiling, peel, select the most mealy, and bruise the potatoes. To take off any bitterness of the yeast, a little bran, milk and salt are added ; and after standing an hour these are run through a hair sieve.

7. Another mode is given by the *Board of Agriculture*.—It directs, to select the most mealy sort, and boil and skin them. Break and strain 12lb potatoes through a very coarse sieve of hair, or a very fine one of wire, so as to reduce the pulp as near as possible to a flour. Mix this well with 20lb of wheaten flour. Make and set the dough of this mixture exactly as if the whole were wheat flour. This quantity makes 9 loaves of 5lb each, in dough ; or when baked about two hours, 42lb of excellent bread.

Doctor *Fothergill* says, if potato bread is cut before it is a day old, it will not appear enough baked ; because

because of the potato moisture [Parmentier's mode in the preceding page, cures this by baking slowly]. He adds, never slice potatoes with a knife, raw or boiled; but break and mash with the hand or a spoon, otherwise they will not be soft.

Doctor *Lett som* next proceeds to give the best soups; according to Mr. Justice *Colquhoun*.*

I. POTATO SOUP. *Colquhoun.*

Stew 5^{lb} coarsest parts of beef or mutton, in 10 quarts of water till *half-done*. Add a quantity of potatoes, skinned, and some onions, pepper and salt. Stir frequently and boil enough. Bones of beef added would increase the soup in richness or quantity.

	Mills.
Estimate in mills. † 5 ^{lb} coarse beef at 60 mills	300
Bones, to enrich it,	50
Potatoes 24 ^{lb} or $\frac{1}{3}$ a bushel	20
Onions, a bunch	60
Pepper and salt	60
	<hr/>
	49.0

It

* Some of the receipts say *boil*; others *stew*; others again, *boil over a slow fire*. Page 342, says, "never boil soups briskly; but leave them long, long over the fire, *simmering* rather than *boiling*." Doctor *Johnson* says,—"It is material that *soups* be cooked in *close* stew pans or vessels that will scarcely admit of any evaporation."

† Small dealings, are conveniently charged in *mills*; or in *cents* and *mills*. 10 mills make a cent, 100 cents or 10 dimes a dollar.

It gives 10 quarts soup, meat and potatoes : and dines 10 men, at nearly 5 cents.—A *red herring* is said to be a good substitute for onions, pepper and salt. But red pepper may be added.*

II. BARLEY BROTH. *Colquhoun.*

It admits of a mixture of almost every kind of garden vegetable and is never out of season. Onions or leeks and parsley are always a part of the ingredients : besides which, cabbage or greens, turnips, carrots and peas may be added. A tea-cup of barley suffices for a large family. *Pearl* barley is dearer, yet not so good as the *common husked* or *Scotch* dressed barley. Water 4 quarts, beef 4 pounds with bones, barley 4 ounces [Count Rumford says *barley-mcal* is better than whole barley, for thickening broth, and making it more nourishing]. *Stew* all together two hours. Then add the herbs cut small, and salt. The whole then *boils* till tender. Skim off the fat or not, as you like it. Onions or leeks must not be omitted.

III.

* An English gentleman assures me he often ate of a plain pottage or soup in Switzerland, which was very agreeable to him ; and that having it made at his father's on his return to England, the family liked it so well that they often had it, though so plain and simple as to be made only of *potatoes skinned, boiled, mashed up, and then flavored with some butter and salt* ; without any pothebs or spice : and yet these were opulent people, used to good living. It is a good substitute for pea soup : and made of the same consistence.

III. *A plain good food, with very little meat ; and as wholesome as can be obtained from wheat or barley.* Colquhoun.

—Cut half a pound of beef, mutton, or pork, into small pieces : add half a pint of peas, 3 sliced turnips, and 3 potatoes, cut very small : an onion or two, or leeks. Put to them seven pints of water, and boil the whole, gently, over a slow fire for $2\frac{1}{2}$ hours. Thicken with a quarter pound of ground rice, and $\frac{1}{2}$ pound of oat-meal (or $\frac{1}{4}$ lb of oat-meal or barley-meal without rice). Boil $\frac{1}{2}$ hour after the thickening is put in ; stirring it all the time. Then season with salt and pepper, or ground ginger. As only a pint will be lost in boiling, it is a meal for 4 persons ; and will cost 2 cents each person.

IV. Cut into very small bits, 2 lb beef, mutton, or pork out of the tub ; or hung beef, freshened in water ; and put them in a pot with 6 quarts water. Boil slow near three hours : or rather stew till tender. Add $\frac{1}{2}$ lb carrots or parsnips, and $\frac{1}{2}$ lb turnips, all sliced small. Sometimes instead of them, a few potatoes sliced : also add some greens, cabbage, celery, spinach, parsley, and two ounces onions or leeks. Thicken with a pint of oat-meal (or a quart, to make it very thick). Boil all well together, and season with pepper, or ground ginger and salt. It will serve a family

family of six, for a day. Or it may be thickened with any kind of meal ; or barley, beans, peas or rice.

V. Take 4*lb*. beef, onions $\frac{1}{2}$ *lb*. turnips 2*lb*. rice 1*lb*. Parsley, savory, thyme of each a large handful ; pepper and salt : water 17 quarts. Cut the beef into slices, and after boiling it some time, mince it small. The turnips and onions infused, and sweet herbs may be minced before they go to the pot. Boil the whole *gently* together, about 3 hours on a *slow* fire. Scarcely two quarts will be wasted in boiling. The rest will serve 18 persons for one meal. Cost 2 cents each.

Where fuel is scarce, the materials in the three above receipts may be stewed in a pot, all night in an oven ; and will next day require but a quarter hour boiling.

VI. *Bake* in an earthen pot, a shank of beef in six quarts of water, with a pint of peas, a leek, and four or five turnips sliced.

I. POTAGES, by Col. Paynter.

Officers Mess.

Three pounds of the sticking piece of *beef*, or a part of a *shin*, or any coarse piece. Boil it in

Y

eleven

eleven quarts of water, two hours. Then add a pound *Scotch barley*, and boil it four hours more, in which time add *potatoes* six pounds, *onions* half a pound, and some *parsley*, *thyme* or *favorie*, *pepper* and *salt*, with other vegetables, and half a pound of *bacon* may be added, the bacon cut into small bits. It gives three gallons of pottage. Boil it over a slow fire, to be thick. It satisfied twenty soldiers, without bread; the nature of the food not requiring any. Col. Paynter adds that the men in the barracks liked it very much; and the officers introduced it into their mess, and found it excellent. Its cost would be 30 cents; or 15 mills a man.

2. A preparative for Pottages. Paynter.

It may be applied as above, or be eaten in mess: an excellent dish. A pound of *Scotch barley* is boiled, and draining the water from it, is set to cool in an earthen pan. A pound of *bacon* is boiled in two quarts of water. A few minutes before it is taken off the fire, put in the boiled barley, when it will immediately fall to pieces, being a jelly whilst cold, and will suck up all the juices, of the bacon, nearly. The remaining water is then poured off. A few *onions* or *leeks* should be boiled with the bacon and herbs. Season with *pepper* and *salt*. A pound of *Scotch barley* boiled four hours, and cooled in

in a pan, becomes *a sort of jelly*; which being put into boiling water, instantly falls to pieces. When the pound of barley is boiled, cooled, and coagulated, the coagulum weighs four pounds. This is an excellent nourishing food, seasoned with sugar; or made into a porridge.

Mr. Lettsom then gives, from Doctor Johnson of Haslar hospital, a number of chosen messes; the result of experiments on diet, made at the instance of Admiral Walgrave, in 1795.

I. A MESS, according to Dr. Johnson.

Beef 1lb, potatoes 2lb, Scotch barley $\frac{1}{2}$ lb, onions $\frac{1}{2}$ lb, pepper and salt. Bacon 3 ounces. Cost 10 cents. This, says Doctor Johnson, would be a dinner and supper for three men; better than the common messes of fat bacon and cabbage, with which bread and beer are required. If one such man eats *a pound of bacon* at nine pence sterling for his dinner and supper, that article alone is equal to what might support three men; independent of bread and beer. Cost, 33 mills a man, or 3 c. 3m.

II. MESS. Dr. Johnson.

The head of a sheep, *barley 1lb, potatoes 3lb, onions $\frac{1}{2}$ lb, pepper and salt, cabbage, turnips, carrots. Water 11 pints. Cost 16 cents. Produce 6 quarts.*

This was preferred to the other, for richness of flavor and taste; owing to the *bones* in the head, which were *broken small* before they were put in the stewpan. It makes a most comfortable dinner for four men. Cost 40 mills or 4.0 cents a meal.

III. MESS. Dr. Johnson.

Bacon $\frac{1}{2}$ lb., barley $\frac{1}{4}$ lb., onions, pepper and salt. Cost 9 cents. A dinner for three men, needing no bread.

IV. MESS. Dr. Johnson.

An ox cheek, barley 1 lb., potatoes 6 lb., pepper and salt, onions 1 lb. Cabbage, turnips, carrots. Water 22 pints. Cost 30 cents. Produce 3 gallons. A meal 18.7 mills or 1c. 8 $\frac{7}{10}$ m.

This costs 30 cents, without bacon; and gives three gallons of very excellent pottage, for 8 men at dinner and supper (perhaps even for 10 men). It was rich, and better than my other pottages. Ox cheek seems to have the preference to the coarse pieces of beef commonly chosen. ~~In all the above cookery,~~ says Mr. Johnson, a *very close stew-pan* was used, which emitted scarcely any evaporation: a material circumstance. He adds: These dishes are not meant to be continual; but to be three or four days in the week.

V. MESS.

V. MESS. Dr. Johnson.

A shin of beef, barley 1 lb., onions 1 lb., potatoes 6 lb. Cabbage, carrots, turnips, salt and pepper. Water 11 quarts. Cost 28 cents. Produce three gallons. Dinner for 7 men. Cost 40 mills, or 4.0 cents a man.

VI. MESS. Dr. Johnson.

Ox's head $\frac{1}{4}$. barley $\frac{1}{2}$ lb., onions $\frac{1}{2}$ lb., potatoes 3 lb. Cabbage, carrots, turnips. Salt and pepper. Water $5\frac{1}{2}$ quarts. Produce 6 quarts. Cost 16 cents. A rich and high flavored pottage. In the last two above trials, the doctor omitted the bacon; because the flavor of it, in some other instances, was too predominant; and it is a needless expense. On the whole of his trials, he found that *ox cheek* or *shin beef* are preferable to any pieces that are *without bones*. See Prison Diet.

POMPION DIET. Doctor Lettson.

The sort common at the tables of the people of Massachusetts, are distinguished by the name of "*the winter, or long necked squash.*" They weigh 10 to 15 lb. This squash is boiled about half an hour: then mashed up with flour or dough. They make

make “ bread, puddings, and most excellent pancakes ; by mixing certain proportions of this vegetable, previously boiled, with flour. But most commonly, they are eaten stewed, the skin being first taken off, and the entrails taken out. It is almost a standing dish at their tables ; even amongst the most opulent.”

General Cautions in Country Cookery.

Soups are never to be filled up or have even a drop of water, hot nor cold, added : and are never to boil briskly. They are to be long, long over the fire, *simmering* rather than boiling. And all soups having roots or herbs, are to have the meat laid on the bottom of the pan, with a good lump of butter. The herbs and roots being cut small are laid on the meat. It is then *covered close* and set on a *very slow fire*. This draws out all the virtue of the roots and herbs, and turns out a good *gravy*, with a fine *flavour*, from what it would be if the water was put in at first. When the gravy is almost dried up, *then* fill the pan with water : and when it begins to boil, take off the fat.—Never *boil* fish ; but only *simmer*, till enough.—*Beef* quick boiled, is thereby hardened : *simmer* or slow boil it, in not too much water.—*Veal* and *poultry* are to be dusted with flour, and put into the kettle in *cold water*. Cover and boil *slow as possible*, skimming the water clean.

It

It is the worst of faults, to boil any meat fast.— In baking pies, a *quick oven well closed*, prevents falling of the crust.

Wasteful or indolent people overlook calculation ; and too many may think but little of the wholesome and nourishing qualities of food. But here are well informed and most actively good men, recommending to the world the results of much inquiry and experience therein. However lightly may be thought of a cent on a single meal of victuals, when the sum of a year's meals is calculated, for a person, a family, and a nation, it becomes striking and important. A cent for a meal, amounts to three cents a day.

Dol.

One person, at 3 cents a day, saves in the year	11
One family of 5 persons	55
A nation of 5 millions of people	55,000,000

The cent thus saved by the good house-wife, on every *plentiful* meal of the *wholesomest* food, would be sufficient for maintaining the most desperate war by the freemen of America, in defence of their country, against the WILES and the VIOLENCES of the great enlightened world !

GIPSUM

GYPSUM MANURE.

Judge *Peters* wrote circular letters to several experienced farmers of Pennsylvania, containing questions on gypsum : to which they gave him answers : An epitome whereof, follows.*

Question 1st. How long have you used the plaster ?

Answer, by Mr. *West* 11 years

Hannum 12

Price 6

Hand 10

Curwen 10

Sellers 8

Duffield 13

Roberts 7

Peters 25

Question 2d. In what state was your land when you began the use of it ?

Answer, by Mr. *West* : tired down.

Hannum : Virgin soil and old land ; good bad and indifferent.

Price :

* Mr. *Ciff* has the pamphlet at large, for sale ; in which the answers are fully given, together with Mr. *Peters's* observations. And I have their permission to publish this epitome.

Price: Worn out; but had been limed.

Hand: Exhausted.

Curwen: Had been limed and dunged, after being exhausted.

Sellers: Poor.

Duffield: Had been in poor timothy.

Peters: Worn out.

Question 3d. What quantity per acre have you generally used?

Answer, by Mr. West: $4\frac{1}{2}$ to 3 bushels.

Hannum: 1 to 5

Price: 1 to 2

Hand: 3 to 4

Curwen: 1 began with 6 and sunk to 1

Sellers: $2\frac{1}{2}$ began with 4 or 5

Duffield: 3 to 5 if sandy 3. If loamy more.

Roberts: $1\frac{3}{4}$ to 4

Peters: 3.

Question 4th. What soils are the most proper for this manure?

Ans. by Mr. West: Warm, kind, loamy.

Hannum: High ground, and sandy soils.

Price: High, warm, dry, gravelly or loamy.

Curwen: Dry loam; better on hilly than level land.

Sellers:

Sellers: Too light and sandy or clay are unfavourable : loam is best.

Duffield: Sandy or light loam.

Roberts: The same ; and watered meadows.
(Sloping is meant.)

Peters: Light dry and sandy or loamy.

Question 5th. Have you repeated the application of it with or without plowing ? At what intervals, and with what effect ?

Ans. by Mr. *West*. They have a good effect. It follows lime equal to any manure.

Hannum. With and without plowing, with very good effect.

Price. The like answer, with many instances of good effects.

Hand. With good effect ; though with less at the last.

Curwen. On meadow and clover every other year, with good effect.

Sellers. Suspects the good effects will be less on a frequent application, as of any other manure often repeated. Improvement of land may be similar to that of animal improvement, which is better promoted by a change of nutriment, than by being confined to any one kind.

Duffield. Good on grafts every 3d or 4th year, without plowing : on maize with plowing.

Peters.

Peters. Good with and without plowing.

Question 6th. In consequence do you find that it renders the earth steril after its useful effects are gone?

Ans. by Mr. *West*. Something of sterility it creates in five or six years by mowing.*

Hannum. Its useful effects have not ceased ; applying one bushel a year.

Price. Never any bad effects ; and the good ceases not.

Hand. Quite contrary to sterility.

Curwen. Quite the reverse of sterility. No kind of manure gives sterility.

Sellers. Have not observed any sterility.

Duffield. Not in the least degree.

Peters. No greater degree of sterility after plaster than after dung.

Question 7th. To what products can it be best applied ? grain and what kinds ? grasses and what kinds ?

Ans. by Mr. *West*. It is best adapted to grass and every kind of summer grain.

Hannum.

* Not the *manure*, but the many *crops* taken off, weaken the soil ; and the four or five years of lay, give the soil time to settle, become hardened and untilled : and moreover, fibrous rooted plants take place and add to the mischief.

Hannum. Beneficially to the production of wheat, rye, barley, Indian-corn, buckwheat, peas, potatoes, cabbage, clover, and all other grasses common amongst us.

Price. I have found it more beneficially applied to Indian corn than any other grain, having never failed, except in two instances : one was in a field a third part whereof had buckwheat in the year before. A row of corn was left unplastered, which run across the fresh broken up land and the buckwheat ground. In the latter no effect whatever was perceptible that the plaster had on it. In the fresh broken up land the crop was very good ; more than double the quantity where it was plastered than in the row that was not. The other instance was in a fine mellow rich piece of land that had been well manured the year before ; from which had been taken a good crop of potatoes and pompons. Three rows were left unplastered : but no difference could be seen between them and the others, where had been sown two bushels per acre. The piece was sown the spring following with barley and clover seed, and the plaster that had been put upon the corn without any advantage, had a great effect upon the clover, which was much better than where the three rows were omitted. The effects of the plaster here, as well

as in many other instances where it has been applied to Indian corn *in mellow land* without effect, is, he says, mysterious in its operations. It has never had any effect (when first applied) on any other grain except buckwheat, when sowed on fresh broken up land.*

Hand. Oats and maize seed wetted and dusted with it before sown, is very good. With lime equal to 3 or 4 times the quantity put on the corn after it is up.

Curwen. Best on red clover, and is good on white clover and mixt grasses. It enlarges the plant of maize more than the product of the corn. Is very trifling on wheat and rye.†

Sellers. All grasses, especially the clovers.

Duffield.

* *Mellow* soils most readily imbibe and retain *moisture*; and therefore have less need of the attraction of moisture by the acid and calcareous matter of gypsum. There is humidity in the driest common air that comes in contact with the soil; and this air is never quiescent. The cultivation given to maize cleans and mellows the soil. Buckwheat is sown on ground scratched over or very imperfectly tilled, and so the ground is *not mellow*; and there the gypsum is useful in collecting and retaining *moisture*, which the scratched half tilled ground cannot alone.

† If it enlarges the plant, it so far promotes its condition for yielding much corn: but untimely plowing and breaking the roots, and great drought or excessive rains afterwards would shorten the crop.

Duffield. Grasses of all kinds and maize, immediate. All other grain the next year.

Peters. Leguminous plants, buckwheat, flax, hemp, rape and other plants producing oil. Garden plants, fruit trees, maize, turnips : oats and barley seed wetted and covered with plaster dust. Best on red clover. Winter grain, oats and barley are not benefitted by top dressing with plaster dust.

Question 8th. When is the best time to scatter it?

Ansf. by Mr. West. The spring when vegetation is abroad.

Hannum : 1st March if free from frost, to the 1st of May.

Price : Soon after clover comes up, and repeat it soon as vegetation takes place. On Indian corn instantly after the first harrowing and moulding.

Hand : In April, or June on mowing the first crop.

Curwen : At any season : best when vegetation approaches rapidly in the spring ; or soon after mowing the first crop.

Sellers : The various times in which it was scattered, prove equally good.

Duffield : Clover being sown with oats or barley, strew it as these grains are taken off ; which gives

gives a good growth to the clover before winter sets in. On a sward, strew it at any time; and on Indian corn as soon as it is up; giving three or four bushels an acre, over the whole ground.

Peters: If strewed in the fall, and a dry frosty winter succeeds, much of the plaster is blown away. He found it answer well sown from beginning of February to the middle of April, in misty weather.*

Question 9th. What is the greatest product of grass per acre, you have known by means of plaster?

Anf. by Mr. *West*: Equal to any ever seen. Would feed as many cattle as acres.

Hannum: Three tons from land really poor.

Price: Land manured and afterwards plastered two crops (cuttings) gave of clover $4\frac{1}{2}$ tons an acre: and poor unmanured land not likely to give half a ton, frequently gave $1\frac{1}{2}$ or 2 tons.

Hand:

* "In many parts of *Switzerland* I have seen *gypsum*, or the *parget stone*, used with uncommon success. Reduced to a powder it is strewed on the land, always before the young grass begins to shoot; otherwise, attached to the blades of grass, the cattle might swallow it with the grass, and its viscous filmy particles prove injurious to the cattle." *Observa.* on Denni. &c. p. 380.

Hand: Three and six-tenths tons, and $2\frac{1}{2}$ tons frequently: never less than $1\frac{1}{2}$ tons.

Curwen: The first crop 2 tons; the second crop, nearly one ton; the third reserved for seed. Without plaster this ground would not yield $\frac{1}{3}$ of the whole quantity.

Sellers: Before the use of plaster, little of pasture was given scarcely enough to fatten cattle for the family use. But for several years back (with the plaster applied) 40 to 50 are fattened annually; besides mowing from the fields, hay enough for a team, family horses, and 20 cattle.

Duffield: Three tons of hay.

Peters: Five tons an acre, at two cuttings.

Question 10th. Have you ever used it with other manure, and what? and the effects if any superior to the plaster alone?

Ans. by Mr. *West*: Never used of it with other manure.

Hannum: Yes: the land will in less time be much more productive. I have not found my land in good heart, in less than three years with plaster only.*

Price:

* A manuring with *dung* and a manuring with *plaster*, are as two to one; *two manurings*. Whether the plaster alone will give good heart to the land in one or in three years will de-

Price : I have put it on after lime and dung frequently, and have always found the greatest difference in the effect, where it has been put on entirely alone, both on clover and Indian corn. *Where the manure has been put the crop has been the greatest*, but their operations are entirely independent of each other.*

Hand : No more grass is produced from his lands previously manured for other crops, than from those which were not so manured, although an equal proportion of plaster and grass seed were sown on each : except in one instance, where ashes were sown on the plaster a few days after it.

Curwen : He never mixed it with manure previous to putting it on the ground, but generally used it on ground limed or dunged or both not long before, and found its effects in a great degree proportionate to the manure in the ground ; though on ground exhausted and never manured, the effect was considerable.†

Z . . . Peters :

pend on the quantity and the quality of the plaster ; and probably, other circumstances.

* Do dung and plaster improve each other's powers ? How does this appear ? They indeed *affect the soil*, as two to one ; and plaster + dung + lime = 3 manurings.

† When it don't follow dung or lime or other manure, it acts alone—an unit, without addition or aid. When gypsum follows them, then the manurings are tripled.

Peters : lands *limed* fresh and some exhausted are all plastered, and there is no difference unfavourable to the limed.

Question 11th. Is there any difference between the European and the American plaster?

Ans. by Mr. *Hannum* : No difference.

Price : None in the effects upon grass or grain : but the European is easiest manufactured, and the American is found to make the strongest cement.

Sellers : The American is best.

Duffield : Can discover no difference.

Peters : The European generally best : but has used of the Nova Scotia plaster to equal advantage.

Question 12th. Its duration?

Ans. by Mr. *West* : The product for five years, mowed twice a year, and the third plastered, is more than can be produced from dung,

Hand : In one instance he mowed the same ground four years successively after four bushels of plaster per acre had been applied ; but found that the blue grass generally begins to appear the third year : therefore he wishes

to mow or pasture two years only, and then plough again.

Curwen: With him it has not been uniform. Whether it depends on the quantity applied, the nature of the soil, the difference in seasons, or the goodness of the plaster, he cannot say: but it sometimes fails the second year; sometimes lasts four or five, and where put on the hills of Indian corn and afterwards mixt with the soil by plowing, the effects have been visible for six years, and continue the same length of time on an exhausted soil never manured.

Duffield: Its effects are perceptible for four or five years.

Peters: Has had benefit from one dressing of three or four bushels to the acre, for five or six years, gradually decreasing in its powers. Has heard of some who sowed it frequently, and in small quantities, and obtained good crops of grass for twelve years and upwards.

For some years of gypsum being first used as a manure in America, it was ground down to measure only about 20 bushels a ton. It now is made to measure twenty-four or twenty-five bushels; which Mr. Peters's experience condemns. He says 20 bushels a ton is to be preferred by the farmer; for that when too fine, it flies away in strewing, and is

not so durable as the coarser. The miller who sells plaster gains by its being made very fine.

We have, says Mr. Peters, a simple mode of trying the quality of plaster. A quantity of the powder, when heated in a dry pot over a fire, emits a sulphureous smell. If the ebullition is considerable, it is good: if it be small, it is indifferent: if it remains an inert mass, like sand, it is worthless.

A Proposal for a State Society, for promoting Agriculture: and that the Education of Youth should direct them to a Knowledge of the Art, at the time they are acquiring other useful Knowledge, suitable to agricultural Citizens.

At a Special meeting of the Philadelphia Society for promoting Agriculture, on the 21 of January, 1794.

AGREED, That Mr. Bordley, Mr. Clymer, Mr. Peters and Mr. Pickering, be a Committee to prepare Outlines of a Plan for establishing a State Society for the *Promotion of Agriculture*; connecting with it the *Education of Youth* in the Knowledge of that most important Art, while they are acquiring other useful Knowledge *suitable for the agricultural Citizens of the State*:

And

And a Petition to the Legislature, with a view to obtain an Act of Incorporation.

At a Special Meeting of the Society, Jan. 28, 1794.

The Committee appointed at the last Meeting to prepare Outlines of a Plan for establishing a State Society for the Promotion of Agriculture, and a Petition to the Legislature for an Act of Incorporation, made report. The Report was adopted. The same Committee are now requested to sign the Petition, present it to the Legislature, and attend the Committee thereof which may be appointed to confer with them on the subject.

To the Senate and House of Representatives of the Commonwealth of Pennsylvania.

The Philadelphia Society for Promoting Agriculture, beg leave to represent :

THAT finding the important object of their association not to be sufficiently attained on the limited plan, and by the means hitherto pursued, they are desirous of promoting an establishment on a broad and permanent basis, which may afford more certain prospects of advancing the interests of agriculture. They also conceive that the acquiring a knowledge of it may be combined with the education which is practicable

practicable and most useful for the great body of citizens.

To shew what in their opinion may, *in process of time*, be accomplished, they take the liberty of presenting to the view of the legislature, the annexed Outlines of a Plan for establishing a *State Society of Agriculture in Pennsylvania*, which shall embrace the aforementioned objects.

They pray that a committee of the legislature may be appointed to confer with a committee of the Society on the subject; and, as the necessary means of conducting the execution of the plan, that an act of incorporation may be granted to the persons whose names shall be presented for that purpose.

The above, with the Outlines, was presented to the legislature, and a conference was held as proposed; but the proceedings were laid on the table, and nothing more was done.

OUTLINES OF A PLAN

*For Establishing a State Society of Agriculture in Pennsylvania.**

1. The legislature to be applied to for an act of incorporation of the society, which is to consist of citizens

* Brought into the committee by Mr. Peters.

citizens of the state, as generally dispersed throughout the same as possible. In the first instance, the society to be composed of such persons as may be named, and these to be vested with authority to make rules for admission of other members, and by-laws for the government of the society, as usual in similar cases. Honorary members to be admitted according to rules to be established, and these may be of any state or country.

2. The organization of the society shall be so formed, that the business thereof may be done by a few, who will be responsible to the body of the society, in such manner as their by-laws shall direct.

3. The governor of the state, the speakers of the houses of the legislature, and the chief justice for the time being, to be the visitors of the corporation. The transactions of the active members, i. e. those entrusted with the monies and affairs of the society, by whatever name or description they may be designated, and all by-laws and regulations, to be submitted to the visitors ; to the end that the same may be so conducted and established as not to prejudice the interests of the corporation, or interfere with or oppose the constitution and laws of the state. The visitors will also judge of the objects of the society, and perceive whether or not they are calculated to promote the ends of its institution. Reports may by them

them be made annually to the legislature. These will be useful, as they will exhibit, in a comprehensive view, the state of agriculture throughout the commonwealth, and give an opportunity to the legislature of being informed on a subject so important to the prosperity of the country, both as it relates to political œconomy and the individual happiness of the people. The legislature will perceive, from their reports, when and in what manner they may lend their assistance to forward this primary object : Whether by endowing professorships, to be annexed to the university of Pennsylvania and the college of Carlisle, and other seminaries of learning, for the purpose of teaching the chemical, philosophical and elementary parts of the theory of agriculture : Or by adding to the funds of the society, increase their ability to propagate a knowledge of the subject, and stimulate, by premiums and other incentives, the exertions of the agricultural citizens : Or whether by a combination of these means the welfare of the state may be more effectually promoted.

4. Though it will be most convenient to make the repository of the information of the society, and the office or place of transacting its business, at Philadelphia ; yet it is intended that the society shall be rendered active in every part of the state. To effect this, there should be county societies established, organized as each shall think proper. In union with,

or

or as parts thereof, there may be agricultural meetings or establishments, at the will of those who compose them, in one or more townships of a county. These may correspond with the county societies, and the latter may annually inform the society of the state (of which the less societies may be considered as branches) of all the material transactions of their respective societies. Societies already formed may remain as they are. They may, at their option, correspond directly with the state society, or through the society of the county in which they meet, as shall be found most convenient and agreeable to them. This will bind up together all the information and business relating to the subject. It will give an opportunity to the society of the state, to see where their assistance is most necessary, and afford a facility of diffusing agricultural knowledge. The premiums, books and other articles, at the disposal of the society, may pass through the hands of the county or other societies, for many purposes; and they can judge on the spot, of the pretensions of the claimants. The county schoolmasters may be the secretaries of the county societies; and the school houses the places of meeting and the repositories of their transactions, models, &c. The legislature may enjoin on these school-masters, the combination of the subject of agriculture with the other parts of education. This may be easily effected, by introducing, as school books, those on this subject; and thereby making it familiar

familiar to their pupils. These will be gaining a knowledge of the business they are destined to follow, while they are taught the elementary parts of their education. Books thus profitable to them in the common affairs of life, may be substituted for some of those now used ; and they can easily be obtained. Selections from the best writers on husbandry may be made by the society. The essays of our own experimentalists or theorists, and the proceedings of the society, will also afford information ; and as many of these will, no doubt, be good models of composition, they may form a part of the selection for the use of the county schools. And thus the youth in our country will effectually, and at a cheap rate, be grounded in the knowledge of this important subject. They will be easily inspired with a thirst for inquiry and experiment, and either never acquire, or soon banish, attachments to bad systems, originating in the ignorance and bigotry of their forefathers, which in all countries have been the bane of good husbandry. It will also be the business of the society to recommend the collection of useful books on agriculture and rural affairs in every county. The citizens of the country should be drawn into a spirit of inquiry by the establishment of small, but well chosen libraries, on various subjects. This would not only promote the interests of agriculture, but it would diffuse knowledge among the people and assist good government,

ment, which is never in danger while a free people are well informed.

5. The general meetings of this society, consisting of such members as may choose to attend, and particularly those charged with communications or information from the county and other societies, should be held at Philadelphia, at a time, in the winter sessions of the legislature, when citizens who may be members thereof, or have other business, can with most convenience attend. At these meetings, the general business of the society can be arranged, its funds and transactions examined, and its laws and rules reported, discussed and rendered generally serviceable and agreeable to the whole.

6. It will be necessary that a contribution be made by each member, annually, for a fund. But this should be small, that it may not be too heavy a tax on members. The funds will, no doubt, be increased by donations from individuals; and if the state should find the institution as useful as it is contemplated to be, the patriotism of the members of the government will be exercised, by affording assistance out of the monies of the state. They will perceive that it is vain to give facilities to transportation, unless the products of the country are increased by good husbandry: and though these facilities are important to the objects of this society, yet an increased knowledge

ledge of agriculture is the foundation of their extensive utility. The subjects of both are intimately connected, and mutually depend on each other.

7. When the funds of the society increase sufficiently to embrace the object, it will perfect all its efforts by establishing *pattern farms*, in different and convenient parts of the state. Let the beginning of this plan be with one establishment, under the direction of the society, and committed to the care of a complete farmer and gardener. In this, all foreign and domestic trees, shrubs, plants, seeds or grains may be cultivated, and if approved as useful, disseminated, with directions for their culture, through the state. The most approved implements may be used on this farm, and either improved by additions, or simplified to advantage. Inventions may be brought to trial, and the best selected. Models thereof may be made and transmitted to the county and other societies. Those who are sent to, or occasionally visit the farm, will gain more knowledge, in all its operations, from a short inspection, than can be acquired, in a long time, by reading on the use and construction of instruments, or the modes of cultivation. The cheapest, best and most commodious style of rural architecture—the most proper and permanent live-fences—improvements in the breed of horses, cattle and sheep—remedies for occasional and unforeseen visitations of vermin—the times and seasons for sowing

ing

ing particular crops—the adapting foreign products to our climate—and preventives against all the evils attendant on our local situation, or arising from accidental causes—may here be practically introduced. The thoughts and suggestions of ingenious men may here be put in practice; and being brought to the test of experiment, their utility may be proved, or their fallacy detected. This farm need not be large. On it the best systems now known may be carried through, and farther experiments made; promising youths may be sent from different parts of the state, to learn practically the arts of husbandry. Manures and the best mode of collecting them, may be tried; native manures should be sought after, and premiums given for their discovery. Their efficacy may be proved by small experiments on this farm, which should, in epitome, embrace the whole circle of practical husbandry. Similar farms may be added, as the funds increase; and thus practical agricultural schools be instituted throughout the state.

8. When the pecuniary affairs of the society become adequate, it will highly contribute to the interest of agriculture, if, at the expense of the society, some ingenious person or persons were sent to Europe, for the purposes of agricultural inquiries. It would be well too, if a few young persons, of promising abilities, were sent thither, to be instructed in the arts of husbandry, the breeding of cattle,

&c.

&c. and to gain a practical knowledge on all subjects connected with this interesting, delightful and important business, on which the existence, wealth and permanent prosperity of our country so materially depend.

9. Although it would seem that a great portion of this plan has reference to the older settlements of the state, yet in fact, many of its most useful arrangements will apply to new settlements, in an eminent degree. These settlements are, for the most part, first established by people little acquainted with a good style of husbandry. The earth, in its prime, throws up abundant vegetation, and for a short period rewards the most careless husbandman. Fertility is antecedent to his efforts; and he has it not to recreate by artificial means. But he is ignorant of the most beneficial modes whereby he can take advantage of this youthful vigour, with which his soil is blessed. He wastes its strength, and suffers its riches to flee away. A bad style of cropping increases the tendency of fresh lands to throw up weeds and other noxious herbage; and that luxuriance, which with care and system might be perpetuated, is indulged in its own destruction. It is discovered, when it is too late, that what was the foundation of the support and wealth of the improvident possessor, has been, by his ignorance and neglect, like the patrimony of a spendthrift, permitted,

ted, and even stimulated, rapidly to pass from him in wild extravagance.

The products of nature, in our new countries, seldom have been turned to account. The timber is deemed an incumbrance, and at present is perhaps too much so. The labour and expense of preparing for tillage are enormous ; and, when the sole object is that of cultivation, very discouraging. European books give us no lessons in these operations. But when the experience of our people is aided and brought to a point, by an union of facts and the ingenuity of intelligent men, now too much dispersed to be drawn into system, it is to be expected, with the surest prospects of success, that our difficulties on this head will be abated, if not overcome. The manufacture of potash, and the products of the sugar-maple, may be objects of the attention of the society. More profitable modes of applying labour will hereby be promoted, and returns for expense in the preparation for culture, be obtained. Facilities for clearing lands may be discovered. Minerals, earths and fossils now unknown or neglected, may be brought into use, or become objects of commerce. In fine, no adequate calculation can be formed of the effects which may be produced by a consolidation of the efforts, and even speculations, of our citizens, whose interests will stimulate them to exertion. Channels of communication will be established,

established, and the whole will receive the benefits arising from a collection of the thoughts and labours of individuals, whose minds will be turned to a subject so engaging and profitable, as well to themselves as to their country.

The application was rejected; by *husbandmen* who were principally to be benefitted. So when it was proposed to supply *London* with water from the river Lee, *London* itself opposed it: but the blessing was forced upon *London*; and it is chiefly supplied from thence.*

Of

* *France* abounds in *sea-coal*, as easily to be procured as it is in *England*; but it is not at all used in families; although other fuel is so very scarce that very many of the people are obliged to lie in bed whole days, for keeping themselves warm in cold weather. This probably was formerly the case in *England*, as it was with some difficulty that the family-use of coal was there introduced; for the people of *England* were opposed to it, on a fancied notion that *coal-fires* are unwholesome, which they could not say from experience. In the time of Queen Elizabeth a bill in Parliament stated that certain tradesmen used *coal* in *London*, instead of wood, to the prejudice of health; and it proposed that the use of it should be prohibited. But since the universal use of coal-fires, the people are persuaded they render the air salubrious, and they are not subject to the pestilential fevers which used so severely to afflict them. So much for inconsiderate opposition by the ignorant multitude to their best interests. St. Fond's Trav. in *England*, 159.—“ We want no information on *husbandry*, we know all about it—Give us labour, we

*Of the Husbandman's Choice of Subjects, between
LIVE-STOCK and GRAIN.*

Meat is deemed a *staple* article of the produce of the lands in *Ireland*, for exportation; so is *grain* of the lands in the *United States of America*. Scarcely any other country than *Ireland* makes *meat* a staple of its produce, but there are several besides *America* that aim at making *grain* their staple; so that it may seem there is a greater opening for enlarging the production and trade in *meat* than in *grain*. *Meat* is raised at a less expense and hazard than *grain*; and, what is of the first consideration to the landholder and husbandman, the raising of *meat* improves the soil, whilst the cultivation of *grain* is ruinous to it.

There is little danger that pursuits after the productions of meat should be over-done more than af-

A a ter

want not your books of information." Farmers in Pennsylvania to Dr. Franklin, when he offered them Dr. Eliot's celebrated Essays on Field Husbandry.

In Denmark, husbandry is promoted by societies; whose first object is to procure persons capable of undertaking and directing a *school of husbandry*. Here Natural Philosophy, Botany, Chemistry, Geometry, and Mechanics, are studiously sought after, so far as these sciences are of utility to Agriculture. The benefits already derived from this establishment are very great.

ter grain; both are *necessaries* in universal demand, and such articles will always find their own value in the market. Moreover it would be advisable to contend for the possession of such ameliorating *staples*, although for a while it might be under some pecuniary disadvantage.

In what country is the manufacturing of grain carried so far, or to such perfection as in these states? Whilst the husbandmen of *Ireland* reckon on *meat* produced and exported, the husbandman of *America* is alert in cultivating and selling in the market, for exportation, all the *grain* that can be produced from his labours and his attentions; but not a thought has he of raising *meat* for the foreign market: he sees that *meat* is produced and applied to domestic uses, and for supporting our seamen on their voyages;—any further he is inattentive to it. He is not moved by observations on *meat* exported as merchandise, and its producing an important income, with essential improvement of the means of further powers of production.

It was during such a state of inattention to *live stock*, that there lately appeared a report of the officers of government to the Congress of the United States, of the general *exports* from hence into foreign countries, for the year 1799; when, struck with the amount of 140,000 barrels of *meat* sent to markets abroad,

I collected into one view, from the report, all the articles of *live stock and its relations*, and also all the articles of *grain and its relations*, exported from *America*, and added thereto estimates of the value. The result of my observations thereon, was a conviction that *live stock*, whilst little thought of by the husbandmen of *America* as an article of the first importance to them and to their country, is equal at least to *grain*, great and important as this is.

A preference to *live stock* productions would tend to restore and support the vigor of our lands, whilst the present rage for *grain* is the cause of their *poverty*, which must increase whilst we continue to take all from the ground, and return nothing to it.

To farmers proposing to make *live stock* the choice of their attention, it is objected there is a *want of a market for live stock*. But that this is not really the case, the following statement may be convincing; for, it proves that *America* finds markets abroad for *live stock*, in value as great as in *grain*; and no person objects to cultivate *grain* "because there is a want of markets." For the *necessary articles of life* there ever must be a demand, a market. Then of those necessary articles, whatever improves the means, that is *amends* the land, must be a better choice of attention than what, whilst it fills the pocket, reduces the means by *impoverishing* the land.

Universally throughout the United States, the culture of *grain* is the anxious pursuit of husbandmen. It is only in the *New-England* states that the raising and selling *live stock* is much attended to by industrious husbandmen.

In the year 1799, according to the said report, there was *exported* from the United States to foreign countries,—

Dol.
Of <i>grain</i> and its relations, to the } estimated value of } 3,800,766
Of <i>live stock</i> and its relations, do. val. 3,783,044
Val. in <i>grain</i> , more than in <i>live stock</i> , only 17,722

—Almost equal; and may be considered quite so in estimates.

If then *live stock*, which is no object of crop or income with husbandmen, except in *New-England*, and on a part of the thin lands in the southern country, insensibly and with little of design comes so near in the amount of value to the favorite and costly production of *grain*, how superior would *live stock* be in value, if it was made the husbandman's favorite object of produce, instead of *grain*? besides preserving the soil; whilst the production of *grain* destroys the soil.

A Table

A Table of Provisions, the produce of the United States of America, exported in the year 1799, taken from the said report, arising as well from grain as from live stock, and their respective relations:

	Dol.
Beans, bush. 20,000	67,603 at 1 dol.
Peas, . . . 47,603	67,603
Oats, . . . 57,359	30cts. 17,207
Rye, 1595	2,147
Barley, 552	70 . . . 1,503
Wheat, 10,056	1 dol. 10,056
Flour, bar. 519,265 = 2,596,325 bush.	Wheat 1 dol. 2,596,325
Maize, bu. 1,200,495	60cts. . . 720,292
Meal of maize, 231,226	
Rye, 49,269	281,449 . 70c. 197,014
Bkwh. 754	
Oats, 200	
Biscuit, bar. 47340	3 dol. 142,020
Starch & Powder, 69000lbs.	20 cts. 13,800
Ship-Stuff, 1,747,088	2 . . . 34,946
	<hr/> <hr/>
	3,800,766

Beef,

Beef, bar.	91,321	.	.	12 dol.	1,095,852
Pork,	52,268	.	.	16	836,288
Tallow, lb.	19926	1,080,317 lb	149,638		
Do. Candles,	1,060,391	13 cts.			
Lard, lbs.	1,451,657	.	.	10	145,166
Butter,	1,314,502	.	.	20	262,900
Cheese,	1,164,590	.	.	14	163,042
Hams & Bacon,	1,412,005	.	.	12	169,440
Sheep,	9733 at 2 dol.	.	.	19,466	
Hogs,	3786	2	.	.	7,572
Cattle,	5304	24	.	.	127,280
Horses,	6290	60	.	.	377,400
					<hr/> 531,718
Dung, remaining to the farms, from					321,637
live stock,	599,000 tons, at 75 cts.				<hr/> 3,783,044
Produced from grain,				3,800,766	
live stock				<hr/> 3,783,044	
Difference,				<hr/> 17,722	

For drawing attentions to *live stock*, the expressions above are strong ; but the idea is, that in thin lands wanting restoration, especial attention is to be paid to *live stock*, at least until the soil is recovered ; and that at all times else a due attention be paid, in a course of farming, both to *grain* and *live stock*. If the one *impoverishes*, the other *restores* the soil.

All

All which we have now confirmed and greatly strengthened on the evidence of the board of agriculture in England, who have published, among other particulars, their declaration that “The husbandry of every country depends mostly on the *market* for *cattle, sheep, and wool.*” They thereupon ask—“How far is the bad culture of *America* owing to a want of those particulars?”—Further they ask—“Is there a demand for *beef, mutton, and wool*, in any quantities for exportation, or otherwise?—And how far does the existence of these circumstances in the vicinity of large towns, remedy such bad cultivation?”

In an answer given to these questions by a farming gentleman of Yorkshire, after he had travelled in the United States, it is said that “*cattle for the curing houses, in all parts of New-England, are calculated in the drove, at 18s. 9d. sterling per hundred lb. hide and tallow included. Beef from 31s. 6d. to 45s. sterling per barrel of two hundred pounds, nett, each, according to quality: the first he says is very bad, the last excellent; and the demand is far greater than the supply: Pork per barrel, not surpassed by any in the world, is 72 to 76s. sterling.* And further, it is observed, from the detail hereon, that it is not only evident that the demand for exportation*

* Cattle at 18s 9d sterling = 416 cents. Beef, medium 38s 3d = 850 cents. Pork, medium 74s = 1646 cents.

tation must be greater than the supply, but that the consumption by the great towns affords a price more than sufficient for all the articles that are carried to them.

In other parts of the Essays, it is contended that *sciling*, or *stall-feeding live stock*, is much more advantageous than *pasturing*; and that *regular rotations* and *systems of crops and business*, are also greatly superior to the common practices and random pursuits. In support whereof, from a publication of the *Board of Agriculture*, are here inserted the following:

“ By direction of the Society of Rural Economy, of Zell, in the Electorate of Hanover, the following was presented by Doctor Thaer, to the *Board of Agriculture*, in England.

“ The two systems of *rural economy*, best proved by experience, and acknowledged to be the most perfect in the Electorate of Hanover, say the society, are the *plan* of stall-feeding, and the Mecklenburg or Holstein *Schlag*, or *Koppeln Economy*; whereof,

“ The *Koppeln or Schlag Economy*, consists in an *equal partition of fields*, into a certain number of portions, and in a *fixed*, or a *regularly varied use* of them, either for *cultivation*, *meadow*, or *pasture*. It has from seven to thirteen portions, established upon

upon certain determinate general principles.—There certainly is no *system of husbandry* more regular, or more to be depended on, so far as it goes, says Doctor Thaer, the writer for the society. The number of the *oxen*, of milch *cows*, the *manure*, the different kinds of *plows* or implements, the *sowing*, the succession of *crops*, every thing is fixed in the most accurate manner. Every *work* has its proper *time*, and its *regular succession*, so as to be done with the smallest possible expence, either by the strength of men or cattle. A possession of many acres is kept in order with the same ease as one of a few acres. This system resembles a clock, which is wound up once a year by consulting the registers: the value of an estate managed in this way, and the rent it can afford, may be determined at once. The conditions on which the ground may be let, are, upon general principles, capable of being determined with such accuracy, that it is not in the power of the farmer to impoverish the land.”

“ But, whoever wishes to draw the *highest possible produce* from his lands; though undoubtedly with a greater expence of money, labour, and attention; whoever chooses to employ a greater number of hands in the useful occupations of husbandry, and to keep a greater number of cattle, *to advantage*, will, beyond a doubt, prefer the mode of *stall feeding*.”

“ The

"The *Advantages of the System of Stall-Feeding,* are founded upon the following incontrovertible principles :

1. A spot of ground, which, when *pastured upon*, will yield sufficient food for only *one head*, will abundantly maintain *four head* of cattle *in the stable*, if the vegetables be mowed at a proper *time*, and given to the cattle in a proper *order*.
2. The *stall-feeding* yields, at least, *double the quantity of manure* from the same number of cattle ; for the best and most efficacious summer *manure*, is produced *in the stable* ; and carried to the fields at the most proper period of its fermentation.
3. The cattle used to *stall-feeding*, will yield a much greater quantity of *milk*, and increase faster in *weight* when fattening, than when they go to the field.
4. They are less liable to *accidents*, do not suffer by the *heat*, by *flies* and *insects*, and are not affected by the *weather*.

"For explaining these principles more accurately, the following short description is here presented, as carried on at a farm called *Effenrode*, belonging to Baron

Baron Bülow, which consists of 700 acres of grass land.

" It had been tilled many centuries ago, and consisted of a very good clay soil. The Baron broke it up, and laid it out in *seven partitions* (koppeln), each consisting of 90 acres, and an additional one of sixty acres adjoining to the farm. The farm has besides, 24 acres of meadow, and 22 acres of *garden ground*.

" The smaller portion, is destined partly for *lucerne*, and partly for *cabbage*, for *roots and vegetables for sale*.

" The *seven main partitions* (koppeln) are managed in the following manner.

" One year, a division or koppeln is manured for *beans*, *peas*, *cabbages*, *potatoes*, *turnips*, *linseed*, &c.; 2. *rye*; 3. *barley* mixed with *clover*; 4. *clover*, to be mowed two or three times; 5. *clover*, to be mowed once, at St. John's, then to be broke up, plowed 3 or 4 times and manured; 6. *wheat*; 7. *oats*.

" The stock of cattle, amounts in all to 100 head; namely, 70 heavy Friesland milch-cows or oxen, to be fattened, which are continually kept in the stable, and about 30 head of draught oxen and young cattle.

" A

" A sufficient, or rather *plentiful* supply of food for one head of cattle, daily if *kept in a stable*, consists upon an average of 130lb of green, or 30lb of dry clover, which answers the same purpose.* Hence one head of cattle requires in 365 days 10,950lb of *dry clover*, or about one hundred cwt. of 110lb each; the portion of food being, according to this mode of feeding, alike, both in summer, and in winter. Hence 70 head require annually, 7000 hundred weight of *dry clover*.

" One acre of clover, mowed twice or thrice, yields 50 quintals, and one acre mowed once, 25 quintals; consequently 90 acres of the former, and 90 acres of the latter, produce 6350 quintals. The deficient 650 quintals, are completed by lucerne, and other vegetables, fit for food, from the smaller portion (*koppeln*).

" Besides all this, the offals of the vegetables of the *lay-lands*, the *straw mixed with clover*, and the *young clover*

* The difference in the quantity of food seems great. In the *Essays*, are allowed 17lb of *hay*; in the present instance 30lb, of what is called *dry clover*. But it is proper to consider that the difference between *keeping* and *fattening* cattle is always great: in the one instance they are allowed only a sufficiency to *sustain* them in healthful plight; which is much below what they are encouraged to eat and have without stint for fattening them. Again, a difference is made between *common sized* cattle, and large beasts: the *Essays* speak of *common cattle*, kept: the Hanoverian account is of *heavy, Friesland cattle, fattened*.—But *hay* is not necessary in fattening cattle.

clover of the fifth portion, when laid down, joined to the stubble feeding, will produce sufficient food for the *draught oxen* and the young cattle. The hay mowed from the meadows, is preserved for the use of the *horses*.

" Each head of *heavy, fat cattle, fed in the stable,* if a plenty of *litter* be given, yields annually, *sixteen full double cartloads of dung*; 70 head therefore yield 1120 fuder or cartloads. Add to this 30 draught oxen and young cattle, at 6 fuder or cartloads, a year, and the produce will be 1300 fuder.

A management of this kind, therefore, affords a triennial manuring per acre, of 10 fuder or cartloads, of good stable dung; and as, to this is united a complete and regular tillage and succession of crops, a double produce of corn may be expected thus:

Acres.			Rix dollars.
90	Wheat yield at 20	1800 at 1 dol.	1800
90	Rye 20	1800 24	1200
90	Barley 24	2160 24	1260
90	Oats 36	3240 12	1080
90	manured lay crop, and 30 acres in the small portion, 120 acres at 15		1800

The *heavy Friesland cows*, fed with the same plenty, both winter and summer, or the Oxen that are yearly shut up twice in the

stables

stables, fattened, and sold at 40 rix dollars
a head.

2800

Thus the farm produces

*9940

"That we may be able to ascertain the *relative proportion* in point of produce, of our *two most renowned systems* of rural economy, the same farm is now to be considered as managed after the *koppeln system of Mecklenburg*.

"According to the quality of its *soil*, which is very good, yet stands in *need of manuring*, it ought to be divided into *nine portions*, of 77 acres each; the reasons for which will soon appear.

"According to experience, these are most advantageously appropriated in the following manner:"

1. *Fallows*, plowed during the whole summer and left unsown; 2. *Wheat*, unmanured; 3. *Barley*; 4. manured *lay-land*, with *lay-crop*; 5. *Rye*; 6. *Oats*, with clover; 7. *Clover*, once cut; then pastured; 8. *Pasture*; 9. *Pasture*.

"By this mode of management, 77 acres are *manured every ninth year*, each acre with 10 fuder or cartloads.

* The *Rix dollar*, in Hanover, is 3/6 sterling: elsewhere, in general, about 3*s.* — *fuder*, is a *cartload*.

cartloads. As one head of *grazing cattle* yields *eight fuder*, 97 head ought to be *kept*. Each head, on this soil, requires two acres for its *pasture*; consequently 97 head require 124 acres, or 2½ koppeln. Hence follows the division 9 portions, as above.

" It may be admitted that among these cattle there are about *eighty milch cows*, the rest *draught oxen*. This kind of economy seldom rears young cattle, but buys them. The *cows* are of the smaller breed, in this koppeln system, or else the pasture would not be sufficient for them. During winter, they live upon nothing else but *straw*; for what little there is of *clover-hay*, is destined for the draught oxen; hence it comes that they do not produce more than ten rix dollars a head. - - - - - 800

" Though by this system the land is *manured only once every nine years*, which according to the *system of stall feeding*, is done *every third year*; yet this is made up in such a manner, by a three years rest, and the lay left quite unsown, &c. that the return of the corn may be admitted at the same rate, but not higher: consequently,

77 acres wheat, yield at	20	1540	at 1	1540
77 Rye	20	1540	24	1026;
77 Barley	24	1848	21	1078
77 Oats	36	2772	12	924
77 Lay-crop	15			1155

Products

	Produce of the farm	6533 $\frac{1}{3}$
From this ought to be deducted, for the expense of house-keeping, &c. nearly		1500
Remains clear produce		5033 $\frac{2}{3}$

" But as such complaints are made of the *expenses* of house-keeping, &c.* attending the system of *stall feeding*, though in this case the young cattle are not bought, as in the other, which is a considerable saving; yet we will admit the highest possible sum, viz. the double, or 3000 rix dollars, to be deducted from the general produce of 9940 rix dollars.

" Hence there remains of clear profit, by the system of *stall feeding*, 6940 rix dollars; consequently it produces, upon 700 acres, a greater profit than the *koppeln economy* of Mecklenburg, amounting to 1906 $\frac{1}{3}$ rix dollars; and every acre of its land is employed at a greater advantage of 2 $\frac{2}{3}$ rix dollars.

" By this calculation, which may vary in single points; but which upon the whole is *proved by experience*, and consequently may be depended upon, one would think that this system of rural economy must become general, wherever it is known; but, as yet there are few farms of any consequence managed in this manner, in the northeastern part of Germany.

* The *Co.* includes all expenses of *stock, seed, tillage, &c.*

Germany. In our country (Hanover) the number of wealthy people who at the same time are enlightened, and divested of prejudice, is too small. In the countries of Mecklenburg and Holstien, there is indeed a vast number of rich and attentive husbandmen; but the farms in those countries are rather too extensive, and the people of the lower class are, comparatively few and *indolent*. It cannot therefore be expected that this kind of economy, which demands much greater exertions, should be soon introduced there. Besides, it is believed in those regions, that the perfection of rural economy has been already attained.

" As a preference is but reluctantly given to such things as a person does not incline to undertake, objections, ten times repeated, are repeated again and again, to discourage the attempt. A few cafes in which this system of economy would not answer, are sure to be referred to. But it appears that the *managers* of the estates, and the *people employed* thereon, were *averse* to the measure, and *united to crush it*; or that on the first outset the aim was misfed, either by parsimony or by rashness; that there was not a sufficient stock of clover hay, or that it was mismanaged when made; in short, that they had been negligent and careless in their process.

" This sort of husbandry does not admit of any material errors; and suitable preparations ought to be made against every accident that is likely to befall it. If once the requisite stock of clover should happen to fail, the cattle used to an abundance of food, will waste away in a manner beyond all possible recovery. If on account of the deficiency of food, *the herds be lessened* in number, *the lands will be exhausted* by the want of *manure*. If to obviate the want of food, a portion is suffered to lie longer for raising food, than it ought agreeable to the system above stated, there will be a want of *straw*, which is so necessary for litter, and the absence of which is extremely pernicious to the health of cattle.

" As in some years, though seldom, the quantity of food produced, may be reduced to only one half, the prudent farmer should endeavour to *keep one half* of it, and likewise *one half of his straw*, from *one year to another*, and ought not to suffer himself to be tempted by any price, be it ever so high, to sell it. As this system is on so great a scale, great difficulties must be conquered.

" In a small farm which I carry on in this manner (says the German writer to the society) at a country house, a quarter of a mile from town, and where from 18 to 20 head of milch cows are kept and fed in a stable, none were ever materially ill,

none

none ever miscarried, nor was there ever any left barren. M. De Bülow can attest the same thing on a greater scale. The cattle, which in our country graze *in the fields*, are, on the other hand, exposed to many accidents.

"I have dwelt rather the longer (says Doctor Thaer) upon this system of rural economy, because though in the English writings on agriculture, I have indeed met with some remarks relative to the *stall feeding* of cattle, yet I have seen none upon the system of economy built thereon: and in the pamphlet herewith sent to the Board, which I wrote a few years ago, at the desire of our society, for the use of the husbandmen of Lunenburg, you will find the most necessary *rules for stall feeding*, detailed. It has already produced such beneficial effects that, at present, you will find from 6 to 8 head of *cattle*, *in the stable* of many a *peasant*, and the *cornfields* *much improved*, by the greater quantity of *manure* they furnish."

Thoughts on hired Labourers and Servants, Cottages and Cottagers.

When *slavery* shall cease or be inhibited, in our country, where or how are means of cultivating the lands of the southern and middle states to be found? The landholders and husbandmen cannot too soon

begin the inquiry, that they may be prepared for the change. Will they consult the practices of husbandmen in the old countries? The most we know of husbandry has been received from them by our ancestors; and improvements in husbandry during the latter part of the late century have been great in Europe.

Information from European farmers, of our time, would tend greatly to improve us in the economy and management of labour and labourers hired: we should especially be assisted by information from them, in the best methods of conducting our rural business with *hired labour*, which would be attended with many particulars, to the wasteful and less thoughtful and respecting *hired labour* considerably ignorant American, equally new, convenient, advantageous or necessary and becoming his profession and station in life, to be practised.

In *Britain*, the country from whence our ancestors first came, are various classes of farmers: generally they are common farmers and gentlemen farmers. The latter have their stewards, bailiffs, &c. The common farmers attend to and conduct their own business, with the aid of their children or a head servant,—nothing like the imposing overseers of America; and they occasionally hire what other labour is necessary.

The

The slave being done with in America, all must then be performed by *hirelings*; who are distinguished into *labourers* and *servants*. The *servant* resides in your family and contracts to serve you by the year, seldom for less than half a year, though sometimes it may be by the month. He receives wages, board and lodging. The *labourer* hires to work by the month, the day or the job; is not of the family, but boards and lodges abroad as he can, or rents a small house, working for you or others occasionally, for wages only.

Some particulars of labour and the economy of conducting farms in Europe are now communicated, for the consideration of the thoughtful class of American farmers, especially of the less experienced middle and southern states; yet there are farmers, particularly in Chester county, Pennsylvania, and as I am informed, in some of the Eastern states, whose practices are very superior, and nearly altogether by the aid of labourers or servants, as above.

It is deemed advantageous for the farmer to have some number of *labourers* on his estate at a rent, in a small very confined house called a *cottage*; and the *labourer* taking it is called a *cottager*. The cottage is a great convenience and comfort to the cottager having a wife; as it is a snug home for her and their little cares; and that this class of people are more happy

happy and independent than the farmer who hires him, is evident from the known fact that they marry more than the farmers, as 9 to 6. Nine in 10 marry, and of farmers but 6 in 10.

The experience of ages fixes the cottage to be very limited. It is recommended by an experienced farmer, that for a man wife and children, it be in the clear 12 by 16 feet area for the ground floor; of which 12 feet square is for the family to sit in, dine, &c. The rest of the area of the ground floor, 12 by 4 feet, is divided for stairs and closet or pantry. The steps are $7\frac{1}{2}$ inches rise, 9 inches tread. Over the ground floor are two rooms, for beds, partly in the roof, and 3 feet from the eaves down to the second floor; that is the pitch or height of the wall or side is 11 feet from the ground floor up to the eaves; of which 3 feet are in the second story or floor of rooms upstairs; the other 8 feet are the pitch of the room on the first or ground floor. A small garden is allowed to the cottage; which gives employment and comfort to the wife and children: but not an inch of ground is otherwise allowed for *cultivation* of any sort, which might tend to draw the cottager from the farmer's business, to attend to an enlarged employment of his own, when he would become a poor sort of *farmer*, inferior and mean, and therefore uneasy in himself, instead of remaining in the comfortable, useful and settled station of a decent, independent

dent and contented labourer. Yet in America, rather than to allow of ground for them to cultivate flax in it, sell them very reasonably the flax they may want, for employing the wife and her girls. The rent for a cottage is about ten dollars. Some cottagers keep one—a few, two cows ; buying for them winter provender, and paying for pasturage : they are subjects of the wife.

Many instances there are of a scandalous neglect of decency, even in opulent farmers, in their not building a single *necessary*, or house of office ; such ought to be provided wherever there is a habitation, be the family many or few, rich or poor—the cottage, or the hovel,—and also *screens*, of some sort or other, effectual for decency sake between the beds of the family children of both sexes.

On a fair statement it may be made appear that, dear as labour is in America, tillage by hired labourers is cheaper, the *net gain* greater, than when the farmer is a slave to his slave in cultivating his ground, as is much the case from infinite advantages taken of their master in very many ways—the little work done by the slaves,—the burthen of their families, &c. Also the parent slaves teaching their children to plunder their masters and instructing them that they have a *right to do it.*

A farmer has 35 slaves : men	6
Women	6
Boys } Girls }	6
	—
Workers	18
Infants, aged, &c.	17
	—
	35

Expence of the 35. Corn, meat, clothes, bedding, &c.	Dollars.
	1200
Mischief, waste, pilfer, &c.	600
	<u>1800</u>

If instead of the 35 slaves, 18 of them workers, the farmer is to hire labour, few hands suffice: the following for the *same farm*, might be a large proportion :

Labour hired, 4 men	400	With these are peace, quiet, order, economy, &c. And but 2 of the men, and 2 of the women and 2 of the boys need be in constant pay, and residing in the family; cottagers or labourers doing the rest of the labour.
3 women	120	
3 boys	60	
2 girls	30	
—	—	
Workers	12	610
Board and lodging	600	—
		1210

Farmers

Farmers who hire all their labour, have with it the attentions of a manager, bailie, or head servant ; and occasionally the labour of cottagers ; which altogether duly attended to introduces an orderly and necessary *economy* :—there then is not an idle hand, nor eater, nor waster yielding nothing profitable or advantageous. The farmer having slaves, generally has supernumerary hands, eating, wasting, making confusion, &c. the year through without abatement. He maintains twenty to pull down or extinguish what other twenty toilers in good works had produced with satisfaction and repute.

A writer who has treated well of hired servants, labourers and cottagers, sets out with the important observation that nothing is more ruinous to farmers than their keeping more *servants* than they have a real occasion for ; and that there must be a fixed establishment of *servants*, proportioned to the extent and nature of the farm : but then this fixed establishment is not sufficient for the whole season of employment ; and there are times and operations which require additional labour. The farmer is fortunate enough who can then find hands for his purpose ; for, generally, when one farmer wants additional aid, others also want it. He concludes, there are but three sources from whence the farmer can expect assistance,—from *towns*, *villages*, or *cottages*. The best *labourers* are from cottages. Villagers are better

better than townsmen, these last being more wanton, vicious, idle and inexpert.

If, says he, the farmer is so happy as to have several well peopled cottages upon his land, there will be no want of hands on extraordinary occasions. The erection of cottages is therefore of importance to the farmer : but he adds, it is necessary for both parties that they be on the best terms. That the cottage family be regarded as a part of his own, in attentions to them ; and that they look up to him as their *friend*. But as some may be ungrateful and little disposed to prefer their landlord, they may be held by a condition that in case they do not give their assistance on pressing occasions, they should pay so much more.

In spare corners of the estate that are dry and sheltered, near good water, cottages should be built, and the cottagers made easy, with avoiding however all *excess* of indulgence. About 6400 or 6600 square feet of ground are sufficient for a cottage garden, or a square of 80 to 90 or 100 feet. There are cottages without any garden : but it was observed by a clergyman who resided in a village amongst cottagers that during thirty years of his attention, cottagers who had a garden were generally sober, industrious and healthy ; and those who had no garden, were often drunken, lazy, vicious and ailing.

Cottagers

Cottagers are limited in fuel, and are therefore saving of it. Their fire place on the first floor is but enough for their frugal and plain cookery ; and in the parent's room above stairs the hearth is but little more than will hold a chaffing dish of coals, used in sickness and to vent the room. Heat conveyed by a stove flue from a fire below, would be safer and more frugal.

The first floor of cottages ought to be raised 8 to 14 inches above the common surface. A shelter or small roof over the out door is convenient and comfortable. Some tools may be sheltered there.

The time for *changing servants* in England is well fixed on Martinmas the 22d November. A more eligible time it is said cannot be devised. The stranger servants then enter in a scene of tranquillity ; and have all the winter to become familiarly acquainted.

The accurate Mr. *Marshal* says, that on the maturest calculation, the yearly expence of hirelings is thus :

A man, in the house costs £. 35 sterling ; of which

wages are	£. 10 a year.
---------------------	---------------

A boy costs	£. 23 of which wages	3
-----------------------	--------------------------------	---

A man, at day labor, even if he works every day is but	27 10 0
---	---------

A boy,	13
------------------	----

So

So that a *man in the house* is more than by the day £7 10 0
besides rainy days.

A *boy in the house*, more than by the day 10 0 0

Where there are more than one cottage requisite on a farm, it is advantageous that two be united; by which the conduct of the families is more public, and their underhand or secret improper movements are seen, discountenanced or prevented: they are checks on each other in what is disadvantageous to the farmer or themselves; and thereby abuses are prevented, at the same time that they are at hand to assist each other occasionally.

Of Pointing Roofs of Houses.

The difficulty of preventing driving rains from entering where the shingling of houses and chimnies join, or between house and house or one part of a roof with another, has been sorely experienced, and complained of without finding the means of relief. Many substances and modes of curing the causes of complaint, have been tried without effect. Brick-layer's mortar alone, mortar mixed with black-smith's cinders—with brickdust—with plaster of Paris—of plasterer's common plaster, without as well as with hair, all to no purpose: the very first rain that fell on the work, swelling the shingles and pressing them close to the brick work, uniformly cracked

cracked and generally forced out some part of the opposing substance, called pointing ; and thus left openings for every future rain to enter, and the frosts of the succeeding winters completed the destruction.

The desire formed by my next door neighbour, in pointing, was to find out an *elastic* substance that when pressed on by a swelling of the shingles, should give way, and when the shingles became dry again, should by its own elasticity return to its former close state. It also was necessary that such substance should be able to resist the injurious effect of driving rains in not easily giving way or decaying.

The tow of hemp my neighbour found to have all the requisite elasticity ; and when defended by a coat of glazier's putty was proof against the weather for seven years that it had then lately been tried by him, although it was very imperfectly pointed with the tow and putty ; so that it required to be renewed ; he therefore directed it to be better done, thus : the joint or junction between the shingles and brick work was well filled with tow forced in by a bricklayer's trowel, and kept down *half an inch below the upper surface of the shingles* ; then putty was pressed down with the trowel on the tow ; and lastly, scraped off smooth, even with the shingles,—so that no part remained on the top of the shingles, but

ever

even with them. Several rains have happened since, yet his house proves perfectly tight; without the least crack in the pointing, or deviation of the stuffing from the state in which it was placed. The putty when partially dried, is yet sufficiently tough to admit of being pressed by the wet, swoln shingles, without cracking: and he took some putty, used on the former trial out of a joint or bend when it had been there above a year, which still retained its toughness, and had not even then acquired the stone-like hardness that it shews on old glazed window sashes.

The pointing should be done in dry, settled weather, that the putty may acquire some degree of hardness in a hot sun, four or five days, lest a rain by occasioning the shingles to swell should press with too much force on the putty. Soaking the tow in oil would be an improvement, he thinks, if it should not deprive the tow of its elasticity—because then if any accident occasioned the putty to scale off or crack, the tow filled with oil would be indestructible by the weather, and would keep the house always tight.

F L A X.

The husbandmen of America generally pay some attention in the cultivation of *flax*. But it is notorious

rious that where *tobacco* is taken into cultivation, not only flax, but even bread and generally all other articles of husbandry are more or less neglected, for giving a preference in labour and attention to tobacco. Both of these articles impoverish ground; but then the flax, requisite, needs only a small portion of ground, and this can be readily changed for other ground, and is easily manured and then cultivated in ameliorating crops, for restoring the soil; —besides it is a necessary article amongst the great mass of farmers and country labourers. It therefore must be produced; though solely for home consumption—not a thread for exportation.

If, says a farmer attentive in cultivating flax, *seed* is to be raised, sow only one bushel an acre: if *linen* is the object, sow two bushels. But unless the ground is previously well prepared by an ameliorating fallow crop, with a full manuring, weeding, and stirring, *sow not at all.*

Flax is said to be better for standing till the bark of the plant is pretty well matured, though not fully so; that the lint may admit of being split into perfect fibres the most minute.

Tobacco itself, in its culture, will give a very clean fallow; but nothing exceeds potatoe, turnip,

or pea-fallow crops, when hoed with spirit; and they also are family comforts.

S L E D S.

A common, handy, light *sled* is in universal estimation in Yorkshire; and it is in continual use, both in winter and summer. It carries harrows and other implements, or rough pieces of small timber, to and from the house and fields. On tender ground, turnips, &c. are carried, rather than in carts. They have two: one small, for one horse; another for two or more horses or oxen; which is larger.

C A B B A G E P L A N T S.

Compared cabbages *transplanted*, with others *not once moved*. The *unmoved* grew and were better than the *moved*. 8 An. 118.

Proposed: that nearly equal portions of cabbage seed and rich moist soil be put together in a box or pot till the seeds sprout, or only show their white pips. Hills of earth keep clean, and just on stirring the ground sow the seeds and soil together in the hills, thin; and as the plants grow, thin them to one. Of other plants, *transplant*, when of the usual size; and compare them, when full grown.

FAT

FAT CATTLE.

Oxen made half fat, or in good plight, on grass or turnips, are then very highly and soon finished in France, upon a *sour* food thus prepared: rye meal (buckwheat or maize meal may be tried) with water is made into a *paste*, which in a few days ferments and becomes *sour*; this is then diluted with water, and thickened with hay, cut into chaff, which the oxen sometimes refuse the first day, but when dry they drink and prefer it. All the French husbandmen are decidedly of opinion they fatten much better because of the acidity. They give it thrice a day, and a large ox thus eat 22lbs. a day. Maize meal, or maize steeped till sour should be tried. This sour mess is given during the last three weeks of their fattening; and they eat about $7\frac{1}{2}$ bushels of meal, value four dollars. Their cattle are of a cream colour, and are very excellent and greatly admired by Mr. Young. Their fat oxen weigh 900 to 920lbs. an excellent size.

NOTES AND INTIMATIONS.

“ The inhabitants of the inland country have more integrity, simplicity, and generosity ; and in all respects have more amiable manners, than those of the sea coast. The latter have contracted a trafficking keen spirit, naturally inimical to the virtues founded on moderation and disinterestedness.”
 Vol. Syr.

“ An apparently great advantage, would be a real evil, if it tended to ~~such~~^{the} touch the morals of the people : on which principle Kliyogg sets very little value on a flourishing state of Commerce ; as he conceives its most general effects are, introducing an inordinate love of money, debasing the generous sentiments of the soul, and familiarizing it with fraud and circumvention.” Rur. Econ. This can only touch the lower order of traders : it reflects not on merchants, whose principles and manners are amiable and exemplary.

V E A L S.

In selling veals to butchers their haggling was extremely disagreeable ; and to avoid it I sometimes either at once broke off, or gave up to their offers. At length, after weighing veals killed for my family,

I fixed on a price by live weight, at which to sell. The butchers at first refused to be fixed at any rate; they afterwards came to, and agreed at 3d. live weight; 3 cents 3 mills $\frac{3}{10}$.

A veal alive weighed 146lb.

—The four quarters 70

which is within 3lb of half the live weight:

At 3d. live weight, this veal would cost them 36s. 6d.: but, for such, they used to give me 32s. to 33s. on the foot. The first sold by live weight were 4 veals; medium live weight, $133\frac{1}{2}$, which averaged 33s. 2d. a veal. They usually sold at 7d. scarcely any part under 6d. sometimes $7\frac{1}{2}$ and 8d. Their gain was above 40 per cent. Lord Kaims says, butchers gain but 5 per cent. in Scotland. They disliked the method by live weight; because of the certainty reducing usual profits, gained from their superior skill in estimating the weight and value of veals.

H A M S.

	lb.	lb.
1788. Dec. 2—20 of my family hams, trimmed, weighed green,	321 or each 16 $\frac{5}{10}$	
1789. June 30—They weighed, when full smoked,	256	12 $\frac{8}{10}$
Evaporation	<hr/> 65	<hr/> $3\frac{9}{10}$
C c 2		The

The loss of weight	$20\frac{1}{2}$	p. cent. or about $\frac{1}{5}$ th.
Dec. 22. A tenant's hams ; 2 weighed,		
green and trimmed	31	
Aug. 11. The same when smoked	26	
	—	
Evaporation	5	or 16 p. cent.

The tenant's were not so much smoked or dried, as he cured them for sale and to weigh.

FAMILY PICKLED BEEF.

"Two pounds *brown sugar* are mixed with a quarter pound of *salt petre* pounded *very fine*. One half of it is rubbed together with a little fine *salt* over the beef. Four gallons of brine, bearing an egg, are boiled and skimmed ; and when *cold*, the remainder of the *sugar and nitre* is added. The beef is then sunk in the pickle, and kept down with a weight."

POCOCK'S PICKLE FOR MEAT.

Admiral Pocock's pickle is greatly preferred, when applied to family beef, pork or mutton.—It is thus made : Water 4 gallons ; Muscovado sugar (or molasses) 1 $\frac{1}{2}$ lb. *salt petre* 2 ounces ; *salt*, the bay or large sort, 6 lbs. Boil all together in an iron pot or kettle, and skim it repeatedly as long as any scum rises ; then take off the pot to stand till the liquor is cold. The meat being placed in the vessel meant to

to hold it, pour the cold pickle on the meat till it is all covered, and in that state keep it for family use. The beef, after lying in the pickle ten weeks, has been found as good as if it had not been salted three days, and tender as a chicken. If the meat is to be preserved a considerable time, the pickle must be *boiled* once in two months; skimming off all that rises, and throwing in during the boiling 2 ounces of *sugar*, and half a pound of common *salt*: thus the same pickle will hold good for 12 months. This pickle is incomparable for curing *hams*, *tongues* and *hung beef*.—When tongues and hung beef are taken out of the pickle, clean and dry the pieces: then put them in paper bags, and hang them up in a dry warm place. Some who have tried this method, choose their meat falter; and instead of 6, use 8 or 9lbs. of salt. In *very hot weather* it is necessary, before the meat is put to the pickle, to rub it well over with salt, and let it lie for one, two or three hours, till the bloody juices run off. If the meat in this case is in the least tainted before it is put to the pickle, it will be entirely spoiled in a day's time, in hot weather.

¶ Pocock's pickle is found so valuable, that no family ought ever to be without it: and persons known to me, keep it constantly ready. The harness-tub always abounds in it, ready for new supplies
of

of meat to be immersed ; and it is almost a *fine non* in housewifery with them !

A present of fat hogs was made to a person ~~t.~~ ignorant of any method of curing hams and bacon but the hogs were cut up, and the pieces *without being at all salted*, were put into the family harness-tub, which contained the remaining brine of beef cured according to *Pocock*. After being in the brine full 6 weeks, the hams and bacon were hung up and smoked as usual till enough. I ate of them, and scarcely ever met with any better. They were greatly superior to hams commonly called “good hams.” The pickle in this case was according to the above receipt. *Dry salting* and then pickling, is the most commonly practised : but some housewives say, *dry salting* hardens meat. It is advisable to smoke hams *early*, that they may be cured before the approach of spring : the same of bacon ; and *green hickory*, smothered with a due portion of saw-dust or tanner’s bark, makes the sweetest smoke for hams, as I am informed ; but for kiln-drying malt, I experienced green hickory alone to be much preferable to *dry oak, ash and locust*.

FAMILY DRIED BEEF.

“ Rub the Beef with a mixture of 1lb sugar, $\frac{1}{2}$ lb. of *salt-petre* and a little *salt*. The nitre, especially, in

in a very fine powder. The beef is to remain 3 days in a tub ; and is then again rubbed with a little more of the same ingredients. The beef, returned to the tub, is to lye two or three days more ; and is then hung up to dry. It seems this is meant to be dried without smoke : but others smoke it very lightly and then hang it, exposed to wind and air, in a dry room.—Cellars and all *damp* places are improper for keeping meat, either salt or fresh.”

WATER BISCUIT.

A great essential, necessary, is to avoid drowning the flour. Give water, a little and little at a time. The mass of dough is to be worked up very dry, under the hand : so that when all is done that can be by the hands, towards gathering the materials together in a firm mass, it still is in parts dry and in cracks with flour here and there untaken up. The rude mass is then committed to a brake (or heavy beater) with which it is worked a great deal, until it becomes smooth and solid, without any further addition of water. The oven is heated to bake *quick* as may be without burning. These points observed, prevent flintiness.

VINEGAR.

“ Ten gallons of apple juice *new* from the press, are suffered to ferment, *fully*: which may be in about two

two weeks. Add then 8 gallons of like juice, that is *new*; for producing a *second fermentation*. In two weeks more, add another like *new* quantity, for producing a *third fermentation*. This *third fermentation* is material.* Now stop the bunghole with an empty bottle, or flask, the neck down. Expose it to the sun for some time.—When the vinegar is come, draw off one half into a vinegar cask, and set it in a cool place, above ground, for use when clear. With the other half in the first cask, proceed to make more vinegar in the same method. Thus always one cask is to make in; and another to use from.

In preparing malt wort for making vinegar, it is neither boiled nor hopped; but only *fermented* and set by the fire or in the sun. A few days produce it, says farmer Ellis. Suppose it managed as the apple juice, above, for producing the *three fermentations*?"

The plant *Tarragon*, called by the French, *Estragon*, gives to vinegar the most excellent flavor, without discolouring it. It is propagated by the plants,
and

* In order that the *vinous* fermentation shall proceed fully to the *acetous*, it is requisite that there be a *temperate* degree of heat; a quantity of unfermented mucilage and acid matter, such as *tartar*, and the free access of external air. Thus circumstanced, the liquor soon passes into the *acetous* fermentation, and becomes *vinegar*; says the Edinb. Dispens. an. 1794, p. 6.

and it would be well to introduce it into our gardens from Europe.

Tarragon just as it is about to bloom, is stript of its leaves, and a gallon of best vinegar is put to every pound of Tarragon leaves, in a stone jug or demi-john, and left to ferment 14 days. It is then run through a flannel bag. To every four gallons of the vinegar put half an ounce of isinglass dissolved in cyder: mix all well and put it into bottles to stand a month to fine: then rack it off, and bottle it for use.

LOAF-BREAD.

A simple and much approved method of making good white bread, is given by Mr. Dossie, thus :

	lb.	oz.
“ Fine flour	6	—
Water $2\frac{1}{2}$ pints, or	2	8
Yeast, liquid,	0	4 or 8 spoonful
Salt	0	2
	<hr/>	<hr/>
	8	14

The water is *warm*, *not hot*.* A part of it is put to the yeast, and well mixed by beating them together with

* A neighbour, nice in bread, observing the fine bread in my family made of dry or cake yeast, was presented with a bottle of the yeast; but afterwards complained the dough could not be made to rise. She *scalded* the yeast.

with a whisk. The salt is put to the other part of the warm water, and stirred till dissolved. Then put both the quantities of the fluid, *gradually* to the flour ; and knead the mass well, till the whole is perfectly mixed. The dough thus made, stands four or five hours : that is till the *critical* moment of its being *fully risen*, yet *before it falls any or more than just to be perceived*. It is now formed into loaves, and *immediately* set in the oven. Baking it properly is a difficulty, to those not well practised : for this, the oven is to be made *hot* as may be without burning the crust. If a green vegetable turns black when put in, the oven will burn the bread ; and it is then to stand open till the heat has somewhat abated. The next care is to keep the mouth of the oven *well closed* till the bread has *risen* to its *full height*. The time for this may be two or three hours. After which, and *not before*, the oven may be opened for viewing the bread, at pleasure, to see that it is baked without being burnt or too crusty. If the mouth of the oven be not *very closely stopt at the first* putting in the bread, and *so kept* till the bread is *fully risen*, it will flatten and not be so light, as otherwise it would be.—When the bread is baked enough, the above ingredients will have lost about $1\text{ lb. } 2\text{ oz.}$ says Mr. Dossie ; which leaves $7\text{ lb. } 12\text{ oz.}$ of well baked bread.” A French author (Delisle’s Arithmetic) says bread ought to be $\frac{1}{3}$ more than the flour alone ; and he appears accurate. But do the French bake so

so brown and *dry* as the English, who sometimes burn and chip the crust.

HANDY-CAKE OR BREAD.

The good people of Long-Island call this pot-ash cake or handy-cake; and make it thus: wheaten flour 2lbs; sugar $\frac{1}{2}$ lb, have added to them a tea spoonful of salt of tartar heaped, or any other form of pot or pearl ash. The potash is dissolved in a little water before it is put to the other materials; and the sugar is stirred into a pint of milk (the better if the milk is sour or coagulated) and being freed from lumps the whole is mixed and kneaded together: this is done in a few minutes; and the *dough* is then instantly fit for rolling out and baking. To be light cake, it is necessary that it be *baked briskly*. The first step therefore, is to kindle a fire, that sufficient of good coals may be seasonably provided. Thus the dough, though flat and unrisen when put on the baking pan, will be puffed up during the baking into a fine, spungy cake. Eggs must be avoided: they would entangle and obstruct the rising; it is therefore held as a maxim that the plainer and simpler the materials are, the better is the cake; some therefore add *cream* rather than butter. More of potash than is allowed by the rule, would give an alkaline taste and render it heavy. The potash must not be in its caustic state, but is

first exposed to the atmosphere long enough, in a jar or the like, to be dissolved and become mild.—By omitting the sugar, if not also the butter, the so much admired *muffins* may be produced: at any rate it gives a light wholesome bread more speedily than in any other method. The potash or salt of tartar is most excellent for health, especially of people apt to be affected with slow or bilious fevers, in flat countries. This cake is noticed and recommended by some ingenious philosophical gentlemen: for which see 8 vol. Monthly Magazine, London, anno. 1800. p. 873. Some to the ingredients add butter $\frac{1}{2}$ lb.

S H E E P.

Sheep do not suffer by being *tied up*; but fatten extremely well on peas, oats, (oil-cake, maize meal and probably flaxseed jelly). The ewes have pea-straw and even oats, *when they lamb*; says Mr. Toofsey. For *soiling* and *stall-feeding sheep*, see Annals 11 vol. 30; in Germany. Pa. 37, in Suffolk; and 12 vol. 234; 14 vol. 133; in Canady 17 vol. 287.

M A N U R E.

Fixed air, says Mr. Amos, abounds in *calcarious* and *alkaline* earths and salts; from $\frac{1}{2}$ to $\frac{1}{4}$ of their whole

whole substance: from whence it is that they are manures; and they *attract* this air from the atmosphere. That it is so is evident from the abundance of it that vegetables yield in putrefaction. This fixed air consists of *earth*, *water*, *acids*, and *phlogiston*. A tun of *caustic lime* attracts ten to 15 hundred pounds of it.—Limestone, 100 parts, crude, contains about 40 of *fixed air*, 55 of *calcarious matter*, and $\frac{1}{500}$ of *water*. Calcining it, must discharge the water, and most of the fixed air which is so important to the mass, as a manure.—But are not these again restored *to the lime*, in slackening or after it is slackened?—He says further, that *quicklime* unites the *watery* and *oily* parts of soil, just as it forms soap. “It is, he continues, also in favour of *lime*, that, exposed to the air it sooner or later acquires its original weight: so that the soil on which *quicklime* is spread, acquires a great increase of matter; the *virtue of the lime consisting chiefly in its power of attraction.*” Am. Drill. Husb. 26. 44. 45.—It is said in America, that 6 or 8 bushels raw powder of lime stone, manures an acre of land, well. I am but now informed of this; when I can no longer make experiments of the kind.

C A L V E S.

Calves running with the cows till 6 or 9 months old, get a good growth. But the best *dairy method* is

is this :—the calves suck a week or two, according to their strength : *new milk* in the pail is then given them, a few meals : then *new* and *skimmed* milk, mixt, a few meals : then *skim milk* alone ; or *porridge* made with milk, *water*, *meal of oats*, &c. until cheese-making begins : after which *whey porridge* ; or *sweet whey* in the field ; being careful to house them at night, till warm weather is settled. Marsh. Midland Counties, 338. Soft sweet hay and tender cut grass may be laid in their way ; with a mass of *salt* clay, as a lick.

BUGS, CALLED CHINCHEs.

“ The French say, take rectified *spirit of wine* 1lb, *spirit of turpentine* 1lb, *camphor* 1oz. Dissolve, entirely, the camphor in the mixt liquor ; and rub over bedsteads, &c.” 16 An. 425. But, a *clear strong lime water*, it is said, answers perfectly well ; is neater, and is even harmless to died silks.

BRINE OR PICKLE.

The rule of brine bearing an egg, may do for things to be soon used. But ought not a true *full pickle*, for keeping *meat*, *fish*, and *butter*, to be *boiled down* till the salt begins to crystallize ? a slight scum

scum on the top shews this, whilst the pickle is yet over the fire."

ICE AND ICE-CREAMS.

" Two pewter basons, one *large* the other *small*: the small one to have a close cover; in this bason the cream is put and mixt with strawberries, &c. to give flavour and colour: sweeten it. Cover it close and set the small bason in the large one. Fill this with *ice* and a handful of *salt*, to stand $\frac{3}{4}$ of an hour: then *uncover* and *stir* the cream well together: cover it close again, to stand $\frac{1}{2}$ an hour longer; and then it may be turned into a plate. *Tin* or copper vessels may do."

FISH, CURED IN THE SUN.

" Soon as possible, after caught, *split* down the back, spread them *open* and flat—*gut* and *wash* out the blood—*drain* them hanging by the tails, in the cool of the evening or in a cool place—strew salt on the bottom of the tub—sprinkle them well with *clean, fine salt*—place them belly to belly in the tub, to lay there 12 hours—then *wash off the salt*, in the *pickle*—again hang by the tails, to *drain* $\frac{1}{2}$ an hour—lay them to *dry*, on *stones* or sweet wood, inclining to the *sun*—never leave them out when the sun is off—nor lay them out in the morning till the *dew* is

is off and the sun shines—a week of fine weather, or less, cures them. When cured hang them up, belly to belly, in a very dry place.”

HOUSE-CISTERNS.

They are becoming more common in Europe. A roof of a house gives a sufficient supply of water. *Rain-water*, when confined under ground, becomes *very pure, palatable, and cool* even in summer. The cistern is in a yard or inside or outside of the kitchen, in some corner near the door. The *deeper the better* the water will be kept. Where the ground is not so bad as to require a round form to a cistern, a cube is a good figure: a double cube must be better, as it gains *depth and coolness*. A cistern of 6 cubic feet holds 16 hds. of 100 gal. each; or 26 wine hds. But the double cube of 5 feet seems better, and would hold above 18 rum hds. of 100 gal. or near 30 wine hds.; and would be 10 feet deep, and cool and sweet in proportion. The pit should be dug exactly by *square and plum*, for carrying up the wall to advantage. On the face of the pit lay the clay plasterwise with a trowel, coat over coat (as it dries and cracks) two or three inches thick in all. Against this firm even face of plaster raise the brick or stone work. Bed the bottom 3 or 4 inches thick with strong clay, beat into a smooth, even wax-like substance. The clay

clay is moderately wetted and beaten with switches, withs, small hoop-poles : not with any thing heavy, or having a broad surface. On this clay floor lay a double bed of brick ; and on the margin of this carry up the side walls half brick thick, laying them in terras. Cover the cistern over, close as may be. Fix to it a small pump, of wood or lead, or wholsomer of iron : the pump to be two feet from the bottom : or a roller and bucket raises the water. Upon these principles, but not exactly like this mode in all particulars, for clay supplied the place of terras, a cistern was built for me six years since, in Philadelphia, which has continued perfect from the beginning. In many places in Europe, rain water saved in cisterns is the only water drunk. And Stolberg's Travels say rain water in cisterns is esteemed according to its age, as being more pure. He drank of some near Naples *three years old*; and it was *excellent*. How superior would cistern rain water be to the people on the flat coasts of America; and wherever else the water is not the purest from springs and wells; especially when *boiled*, cooled and filtered.

WATERING-PONDS.

The 1st Bath Letters, and 6th and 8th Annals, speak of the practice in making these ponds in dry fields and yards, for watering cattle. Dry lime is

D d

sifted

sifted 2 or 3 inches thick on the bottom of the place scooped out for the pond, for obstructing worms and beetles. On this lay *clay, moist* (scarcely wet) well switched and *beaten*, 6 or 7 inches thick. On this lay *gravel* 6 inches thick. A pond 20 yards diameter is first dug out one foot deep, and then deepened, sloping like a bowl, to the centre; where it is $4\frac{1}{2}$ or 5 feet deep.

HERRINGS, SALTED—AND CURED.

Lord Dundonald, in his book on salt, gives the *Dutch* method of *salting* herrings—and then of *curing* them; a distinct operation from salting. **SALTING**: immediately as taken, gut the herrings by the finger and thumb tearing away the gills liver and stomach; the long gut, to which a fat membrane adheres, is drawn so far out as to be left pendent. Soon as gutted, salt the fish and stow them *close* in the barrel; laying each layer in a contrary direction to the one below. The barrel is coopered *close* up, soon as full. Be careful to have none but perfectly tight barrels. The herrings remain thus, to *pine* in this first salt and in the bloody juices or brine, 14 days with *small salt*, or 3 or 4 weeks with *large salt*.—**CURING**: this prevents a tendency which the bloody liquor or brine has to putrify. A proper *curing* depends on a process whereby the *cil* contained in the prepared liquor or brine, by being

being rendered *miscible with water* and reduced to a saponaceous state, is preserved from the action of the *air* and turning rancid.—After the herrings have been a sufficient time in salt to *pine* or throw their liquor (part with their juices), empty the barrels of them upon a large dresser having a ledge round it, and inclining one way for the liquor to run off into a vessel. Boil the brine in an iron vessel: skim and draw it into a wooden receiver; letting it *cool*. Take the *melts* of thirty male herrings for every barrel. Bruise or triturate them in a mortar: add some of the liquor, as you triturate; and when well dissolved to the state of a rich emulsion or saponaceous liquor, mix it with the boiled liquor in the wooden vessel. Then lay the herrings in the barrels, and a layer of salt between the rows, as in the first salting. Cooper the barrels close, and fill them with the prepared liquor, at the bung or head.

C A N D I. E S.

“ Dissolve 25lb of *beef tallow* and 15 of *mutton tallow*, in a copper or brass vessel, with $\frac{1}{2}$ lb of *boiling water* to each pound of tallow. Mix therein $1\frac{1}{2}$ quart of *brandy*, when the tallow is melted, and 5 ounces *salt of tartar*, 5 ounces *sal ammoniac*, 5 ounces *cream of tartar*, and 2 ounces dry, clean *potash*. Boil all together $\frac{1}{4}$ hour. Cool it. Next day take

D d 2

out

out the cake, cut it into slices, and expose to the *dew* and air, till it becomes a fine white mass, hard almost as wax. Make the wicks of *best* cotton spun very fine and very even and clean. Steep the wicks in spirits of wine; and harden them under a coat of wax. Then pour the tallow on them, in moulds."

POKEMELT.

Green cucumbers, middle sized or rather large and even tawny, are put into a *jar* or cask. Upon each layer of them, add a layer of *white* oak leaves, and black currant leaves. Over every layer sprinkle dill seeds, mustard seed, horse-radish and garlic: and to every twenty cucumbers, one bell of pepper. Make a brine of salt and water, not quite so strong as to bear an egg: to every gallon whereof add a quart of good white wine vinegar; and fill the jar or cask with the pickle, cold, after it has been boiled and skimmed. A gentleman from Russia gave this account, to some friends in Philadelphia. He said the pickled cucumbers, according to the above, are used in Russia; and that it is said there, the Empress had a cask of them for every day in the year. Mr. Swinton, the traveller, gives another way of making pokemely; which is this:—A layer of oak leaves is first put into the bottom of a *cask* which is best of white *oak*: then a layer of cucumbers; and so alternately till the cask is filled. A
pickle

pickle is made, as is common, with salt and water ; not too strong : and it is poured over the cucumbers in the cask. The cask is kept in a cool cellar. The cucumber is soon fit for use, and keeps good a year or more. He imagines if some vinegar was added it would be wholesomer, especially to Russians whose great use of salt messes renders them very scorbutic: The gentleman who gave the first above receipt said, the pickle was to be acidulated so that the taste of vinegar should be very slight. He directed also that the cask be of white *oak*, and the cucumbers be rather full grown, and put in whole. I have eat of them as made in the first above method, also some split into four lengths. It is a much admired pickle, mild and winning. I saw a lady nearly make her dinner of them : for they are served up in plates-full ; and are in a stile different from, and milder than other pickles.

R E N N E T.

Mr. *Marſhal*, in his Rural Economy of Norfolk, gives the following as the best way of saving rennet skins.—Throwing away the curd, the stomach of the calf is washed clean and salted thoroughly inside and out, (with fine pounded salt, it is presumed ; for he adds) leaving a white coat of salt over every part of it. It is then placed in an earthen (better if stone) jar, for 3 or 4 days. It is then hung up, 2 or 3 days,

days, resalted and placed again in the jar, covered tight down with a paper pierced with pin holes ; where it remains till wanted, for use. It ought to remain so 12 months, to be strong : but may be used a few days after the second salting.

RENNET LIQUOR.

A handful of the leaves of sweet briar, another of the dog rose, and another of the bramble, are boiled together in a gallon of water with three or four handfuls of salt, for a quarter of an hour. Strain off the liquor. When quite cool put it into an earthen or stone vessel and add the prepared maw or stomach skin. Then add a sound lemon, stuck round with $\frac{1}{4}$ ounce of cloves. The longer it is in the liquor the stronger is the rennet. When strong enough, take out the skin. Hang it up two or three days to drain. Resalt it : put it again in the jar ; and thus continue to treat it, till its virtues are exhausted, which will not be till used several times. *Marshal.*

C U R D.

'The warmer the milk, the sooner it coagulates : but if too warm, the curd is tough and harsh. The cooler the milk and longer in coagulating, the more tender and delicate the curd.—The length of time between the *setting* the milk and the *coming of the curd*

curd may be regulated by the *warmth of the milk* when set ; or by the warmth in which it is *kept* whilst it is coagulating ; or by the *strength and quantity* of the rennet.—Perhaps it is not the heat when *set*, but the heat when it *comes*, which gives the quality of the curd.—The curd should be *covered* to make it come *together* : it may otherwise be hard at the bottom half an hour before it comes at the top.—Milk immediately from the cow is 95° of heat—From a number of experiments Mr. Marshal concludes that curd of a good quality is obtained from *milk heated from 87 to 103° of Farenheit* ; provided that the rennet be so proportioned that the *time* of coagulation be from $\frac{3}{4}$ to $2\frac{1}{2}$ hours ; and provided that the milk be properly *covered*, during the process of coagulation—But from these and numbers of other observations it rather seems to him, at present, that from 85 to 90 are the proper degrees of heat : that from *one to two hours* is the proper time of *coagulation*, and for keeping the milk *covered* ; so as to lose in the process about 5° of its original heat. *Marshal.*

B E E R.

It is said Sir John Dalrymple proposes that beer be brewed with *wort-cake* and *hop-cake*, combined with *yeast-powder* : which may be with cold water. One pound of the cake is to make a gallon of table beer : and it is thought it would answer well at sea, and save

stowage

stowage.—I have cured yeast in cakes, by smearing tubs with it, and exposing it to evaporation in the shade and wind till perfectly dry. My dried cakes of yeast were broke small, and kept in bottles, quite dry and well corked.

E G G S.

Into a tub put a bushel quicklime, 2lb salt, and $\frac{1}{2}$ lb of cream of tartar, mixt in water to bear an egg with its top just above water. Keep eggs in this; which may be two years, says Repert. 177.

L E V E L.

The *span-level* is always used by irrigators of meadows in Pennsylvania. The bishop of Landaff (Doctor Shipley) it is said was so pleased with it that he prevailed with Mr. E. a Pennsylvania farmer to direct the making them for him. The Repertory of arts has given proper directions for using it thus:—At the level of the water, where you begin, drive a pin into the ground; on which one leg of the level can rest; then bring the other leg round, till it touches the ground on a level with the top of that pin: there drive in another pin; and having adjusted the level *perfectly*, make use of this last pin as a rest for one foot, turn the other about till you find the level in the same way; and so proceed on. Thus at once

you

you discover the precise directions that the water course should hold, without digging through heights or filling up hollows. This is to conduct water *perfectly level*.—If *declivity* is to be given $\frac{1}{4}$ $\frac{1}{2}$ inch or more in every 12 feet (the span of the level), instead of wooden pins, make use of *one pin of steel*, having *inches, halves, and quarters*, marked on the sides, from the square top downwards; and have *a number of wooden pins*, cut neatly at the top quite square. After fixing the iron pin quite level with the first, drive a wooden pin into the ground close by it, making its head go $\frac{1}{4}$ or $\frac{1}{2}$ inch lower than the top of the iron pin. Then pulling out the iron pin, and employing the wooden one as a rest for one of the legs, put the iron pin in again for the other leg, and driving another wooden pin into the ground, a quarter inch lower, proceed forward in this manner, and the canal will have the same uniform degree of slope, throughout its whole extent. Thus the fall can be regulated to any assignable degree. One of these levels I used at *Como*, in Chester county, with great satisfaction, for directing water in irrigating the land. See plate.

WILLOWS.

There are low, broken, swampy lands little suitable for meadow, which may be profitably planted with willows. A Mr. Lowe, in England, improved such

such ground ; by laying it out from 3 to 4 yards wide, with a ditch on each side, 3 feet at top, 1 foot at bottom, $2\frac{1}{2}$ feet deep ; but the ditch is to be deep and wide, according to the condition of the ground, for giving near a yard of earth *above the level of the water* ; towards which purpose, the earth dug out of the ditches, is thrown on the land. Then dig the ground two spades depth, unless it be very boggy. The plants are to be kept perfectly clean, especially the first year. The sets or truncheons are cut 20 to 24 inches ; avoiding to bruise the bark in cutting or planting : they are therefore cut in the hand, not on a block. The ground is opened with a crow bar, 14 to 20 inches deep ; and 4 to 6 inches of the plants are left above ground. The cuttings were from poles of three years growth ; and placed 3 feet apart, quincunx.—One, two, or three shoots were left to grow. At 8 years old he sold off near 500 dollars worth on an acre. Where the plants are puny and weak, dig in manure to their roots. The poles so sold, at 8 years old, were 33 to 36 feet high, enough for three rails, 2 at bottom and one at top. But their great use was in making hurdles, gates and implements of husbandry. The time for planting is from January to the end of March ; and the sets are to be *cut* from December to the end of February, *whilst the sap is down*. Rep.—It is with caution that the *yellow willow* should be planted near springs and wells of water. I have heard of these being damaged

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ed greatly by the willow roots, and of a spring being stopt entirely. On a farm which I lately bought in Chester county, water was carried under ground near 300 yards from a spring which had been choaked, as the tenant thought mischeviously, by twigs of the yellow willow being cut and put into the tube at the spring. They drifted and lodged at different parts of the tube, and there threw out masses of roots, very small, sponge-like, and close, so that the water was, in a while, totally stopt from passing through. The whole of the tubes I have caused to be taken up and replaced ; and a stone house built, and locked up, over the spring. See, of Swamps, the next article.

SWAMPS.

I have read of a swamp, of which meadow could not be made ; and, being a disagreeable object, large deep ditches were dug, and the earth thrown up into little islands ; which were planted with willows, and formed beautiful clumps of trees, here and there ; so that nothing was seen but these trees, and various peeps of water. The ditches answered for fish-ponds. See of willows ; the preceding article.

Lombardy poplar is planted about habitations in America for ornament : but an Italian gentleman says, in Italy it is sawed at mills whilst *green* into boards

$\frac{1}{4}$ to one inch thick, and into plank 2 to 3 inches thick ; and is greatly applied to making packages for merchandize. Nails are not apt to draw in these packages, the boards whereof are thin ; and the wood being tender is easily cut into thin boards with handsaws. In 20 years their trunks, he adds, grow to be 2 feet diameter and 30 long. Boxes of it made strong for the use of vineyards last there 30 or 40 years ; which induces the expectation that they may last long in *fence-rails* or logs. As fuel he says it makes a much stronger fire than the willow. The weeping willow is a singular and valuable ornament. Of other willows and osiers, the best adapted to making baskets, hurdles, tool handles, &c. no husbandman ought to be without a permanent stock in full growth. For the more general, extensive and important purposes, the Larch (*Pinus Larix*, Lin.) must have the first attention of landed men. See Doctor Anderson's 3d volume of Essays on Husbandry, for a full and satisfactory account of it, and of the extensive propagation of it in Scotland ; with its useful and durable qualities ; and its very quick growth, so much wanted in the oak.

• Mr. Young speaks of fish-ponds ; and of four ponds, an acre each, one above another, on a stream, which turned a mill below the ponds. 19 An. 400.

DISTILLATION.

The *Dutch* method of preparing wash, for malt spirit, saves much trouble and procures a large quantity of spirit. It is the most profitable method, and reduces the two operations of *brewing and fermenting* into *one*. It is this:—In proportion to 10*lb* of malt in *fine meal*, and 3*lb* of common wheat meal, they add 2 gallons of *cold* water, stirring all well together: then add 5 gallons of water *boiling hot*; and again stir all together. When this is cold they add 2 ounces of *solid yeast*; and ferment it in a warm place, loosely covered.—In England, by drawing and mashing for spirit, as they do for beer, pumping into coolers, and running it into fermenting backs, and fermenting it, they have twice the labour, and lose much spirit, by leaving the gross bottoms out of the still, for fear of burning. Sibley's Hist. Miscel. pa. 352.

POWER—DRAUGHT.

The 16 An. 562, says, *cars with one horse* are preferred; and that they carry 160 large bricks, of 14*lb*, equal to 2240*lb*. These cars are about 5 feet square, and 1 foot deep; containing 25 feet: 27 f. a cubic yard is a load of earth. The *wheels two feet diameter*, run *under* the car, as in Ireland.*

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* I directed a cart to be made on the principles of Sharp's waggons on rollers. The wheels of this cart, or rather the

The 18 An. 179, says, one-horse carts prove much preferable for all works of husbandry : and the form of such a cart, *with an ox* in thills and gears, and bridled, is given. This cart is 5 feet long : $3\frac{1}{2}$ broad : 2 deep ; equal to 36 cubic feet.

The strength of a common *man*, walking *horizontally*, with his body inclining forwards, is said to be equal to 27*lb*. If he walks backwards the force is said to be greater in pulling backward ; and it is said to be known that a horse draws *horizontally* as much as seven men ; that consequently his strength is equal to 189*lb*, when drawing *horizontally*. Yet in *ascending*, three men laden with 100*lb*, each, will go up a pretty steep hill with more ease and expedition, than a horse laden with 300*lb*.

I have often seen about a tun weight drawn, and sometimes up a trying hill as from Market street wharf, Philadelphia, to Front street, by *one horse in a dray* having wheels of three feet diameter. On level ground, with such low wheels, his whole power is exerted to advantage ; *upward*, from the centre of

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rollers, were two feet diameter, and 16 inches tread, sawed out of oak. They performed admirably, except when running over old cornhills : they then jumped continually. With 4 oxen it carried 120 bushels of wheat, 700*lb*. easily. The rollers were under the body ; and this was nearly square with equal sides. Carts are used with *one ox*, instead of a horse.

the axis which is below his point of draught. Horizontal draught, has but 189^{lb} of power to be added to some portion of the horse's weight. But in drawing upward it is with an increased power. Contrary to common reasoning, a horse draws more in a dray having three feet wheels than in a cart having five feet wheels, or else I must strangely be mistaken in my judgment of what I have seen and concluded were facts. The line of draught, from the axis of a three feet wheel, is elevated; which gives the horse a lifting purchase, with the aid of his legs, and better foot-hold pressing more directly on the ground: but when the wheel is five feet high, the *draft* is in a line nearly horizontal, and the horse pulls to disadvantage with a horizontal exertion of the footlock; which is very inferior to the power exerted by the *foot and leg*, when drawing upward they press more directly on the ground.

S H E E P.

The universal food for sheep in England is, in summer, common grass and clover; in winter, turnips for winter feed, and from turnips to vetches in the spring: hay, only when turnips fail. Of stock sheep, 100 require 5 acres of turnips, and 15 acres of clover. Good inclosed pasture will carry six sheep to an acre. 19 An. 295. 298.—A tun of hay a day was eaten by 700 sheep; which gave to each 3 $\frac{2}{3}$ lb

a day, and was rather scanty. “Cabbages are better for sheep than turnips two to one”—After the sheep are a little accustomed to their stalls, they thrive well. They are there fed 3 or 4 times a day, and have clean litter. 18 An. 105. 111.—In America, plant a cabbage in the step between every two hills of maize, the partial shade may be favorable to them. It is said that colliflowers succeed better when planted amongst maize, than when in a garden, *gooseberries* also require some shade. Thus they are raised without labour; for the maize must be horse-hoed. What would be the difference between letting the plants grow into cabbages from the seeds, without removal, and transplanting as usual?

FRESHENING SALT PROVISIONS.

In my passages on the Chesapeake, I observed my skipper would sometimes slice salted barrel pork, and in a few minutes freshen the slices in a frying pan; and then boil them for his dinner. The pork slices were put in fresh, cold water, in a frying pan, and held over a fire till the water *began to simmer* (never suffering it to boil in the least). This water was then thrown away, and other cold fresh water was put in a pot together with the slices of pork. They were then boiled till enough.—This was applied, in my family, to freshening salt fish: especially cod sounds; and it answered admirably. Sometimes they were so

over

over freshened, that it was necessary to eat salt with them.

TURNIPS.

In Kent's Hints, page 128, is the following on turnips.—In crops they answer three great purposes ; to *clean the ground* : *support live stock*, a vast deal : and *prepare for other crops* ; particularly for barley and clover, or grass-seeds. The *turnip crop* is the Norfolkman's sheet anchor ; and he spares it no pains. The stubble of wheat, barley, or oats, is preferred for bringing on turnips. They plow very shallow ; so as to skim off the rough surface only, some time before Christmas. In the following *March*, it is well harrowed (their soil is a sandy loam) and then is cross plowed to its *full depth*. In *May*, it is plowed again, the same depth : and if dry weather and the soil stiff, immediately *barrow* after this plowing. By the *first of June*, it ought to be perfectly clean. Now, 10 good cart loads of *manure* are laid on an acre, regularly spread, and plowed in quite *fresh*, half the depth of the other plowing.—It thus is left till about the *21st of June* ; and then is well *harrowed*, to blend the soil and manure together.—It is then *plowed* to its *full depth*, and harrowed, once only, the way it is plowed.—The seed is then immediately sown, on the

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fresh

*fresh earth ;** not even waiting for the plowing a second ridge. A quart of seed an acre is sown. The seed is harrowed in twice, the same way the ground was plowed. The *harrow* is short tined, and the lighter the better.

The nicest part of the turnip husbandry now remains to be observed : It is *hoing* ; without which *all* the former labour is *thrown away*.—When the plants cover *three inches* in diameter, *hoe* them with a 10 inch hoe ; and set them at 15 inches apart ; without regard to the apparent health in the choice of those left. About 10 or at most 14 days after the first hoing, the ground is *hoed* a second time, so as to *stir the mould* effectually between the plants, and to check weeds. About 14 to 20 days after the 29th September, the turnips are fit for consumption, and so to April, unless the frost injures them.—Where the land is *wet* the *whole* are *drawn*, and fed in cribs. On *light dry land*, every other ridge is drawn.

He adds, 20 acres of a good crop of turnips *fatten* 15 or 16 bullocks, and *support* 10 followers or store cattle for 25 weeks ; or of sheep, as 8 to one bullock.

* In Maryland, turnip seed is usually sown a full month later than this.

bullock. But the greatest advantage is in *cleaning*, *meliorating* and *preparing* the soil for other crops.

To save turnips in the field, they sink some beds in the ground where they grew, about two feet deep, of a considerable width, and lay 5 or 6 layers of turnips in them, one upon another, with a little *fresh earth* between every two layers, and cover the top over with straw, to keep out the frost. Or pile them up in small stacks, with the greens outward, and a little clean straw between every two layers; and lastly cover or skreen them with wattles lined with straw.*

E e 2 MANURING

* At Wye, with intention to try a new mode, my turnips were sown in broad-cast, thick. A plow having a narrow fin without its mould board, was run through the young plants, carefully, for leaving them on narrow slips of earth. Hand-hoes followed, working across the rows, and cutting near a foot width of the plants quite up; the hoers stooping occasionally to thin the clusters of turnips left by the hoes. A double mould board plow afterwards run through the intervals, heaves up the earth on each side and leaves the plants on clean ridges. Advantageous as this proved, I could not procure it to be repeated more than once more, a few years afterwards. Overseers are as fixt to old habits as the negroes under them; and I was much abroad on other business. I have indeed always found the negroes better disposed to execute my designs, than the overseers, who invariably are attentive and ingenious in taking short cuts for slurring over all work, to soon get rid of it and go a frolicking. I usually sowed near the end of July though I felt disposed to break through the practice; and sow a *little later*, for saving them before they were old in growth when they incline to be open

MANURING ORCHARDS.

When a boy, I observed that hogs were much in orchards ; stalks and trash of tobacco were placed round the foot of the trees, on the ground, in small heaps, during winter ; and then apple trees in orchards bore better, and appeared much larger and more perfect than at this time. Hogs feed on potatoes. If orchards were planted irregularly with potatoes or Jerusalem artichokes, * and hogs turned on them

and spongy, and therefore do not keep so well as younger turnips, close and in full vigor. In that country turnips are but little hoed and that slovenly : and to thin the plants the country people think would be destroying what they had done. They count the turnips by the *number* of plants, rather than by the *quantity* of the roots.

Turnips in rows, having 12 or 14 inch intervals. *Every other row taken up* and saved, would leave intervals 24 to 28 inches wide. Cover the remaining turnips with long dung : then in November, before the frost sets in, dip deep a double mould board plow, and heave the earth on the turnips, to stand the winter. Make the experiment. Such a plow is highly valuable on many occasions. It especially saves 2 or 3 bouts in clearing out, when plowing maize. Of *potatoes* every other row taken up would leave three feet intervals between the rows of remaining potatoes. The haulm cut off and laid on these potatoes, may then be covered by the earth heaped on them by a stout double mould board plow ; for keeping this half of the crop through the winter. It may be first tried, in a few rows.

* But I suspect artichokes are more impoverishing than potatoes.

them when ripe, two valuable purposes might be answered : their *dung* secured, and the ground *stirred* ; the turning over whereof buries and secures the dung to the foil.

PORK KEPT FRESH A YEAR.

A Mr. Poultney, of Philadelphia, dined on board a Spanish ship of war, at the Havanna, and ate of boiled fresh pork which appeared as if just killed. He was told it was killed and put up near a year before, at La Vera Cruz. The bones were taken out, and without any salt, the pieces were covered with Spanish brown (a red ochre). It was then packed in bags, for the officers. They shewed him some in bags, where they were smothered in red ochre : which is washed off with warm water, previous to boiling it. I presume any other pure, impalpable, especially dry astringent clay would answer as well. Some clays so far partake of alum, as to shew it exuded, like a white mould. Such I have seen and tasted on the banks of the Chesapeak. But does Spanish brown contain alum ?

BARRELED BEEF.

Being at an inconvenient distance from market, and seldom able to sell my beeves, on the foot, but at a very low price, I found it advisable to depend rather

rather on barreling up from the grass, than on selling on the foot. From ignorance of a proper mode of performing the business, part of my beef in the first attempt spoiled. On four years experience, I prefer the following ; which procured a good character to my beef, at market. I killed between 24 and 30 beeves which were raised on the farm, fat from the grass in the last week of October.

The beeves may be kept up from food and drink, two days : the better if close and dark, and then slaughtered ; after so fasting they are found to *bleed better*, are handled *lighter and cleaner*, and every way *look better*. I had experienced this ; though it was not my common practice. I found that in common upon the first salting and the meat lying in open barrels *four* days, there has been drawn out by the salt, 8 gallons of *bloody juices* from 432^{lb} of beef. This is of the nature of pining of herrings, by the Dutch. Compare that in pa. 418, with this method of *salting* and *curing*.

The *barrels* are to be ready, sweet, and well trimmed ; and the *salt* previously washed or refined, and ground small, before the beeves are to be slaughtered.—I killed 14 beeves as *to-day*, and salted them to-morrow morning. *Delay* in salting is injurious : so is exposure to the *air*, even after it is salted. The pieces are therefore packed into the tight barrels
piece

piece by piece as they are salted ; instead of bulking them on a frame or dresser to drain, as had been the practice : and instead of remaining two weeks to drain, exposed to the air, they are now 6 or 8 days left to drain, in close barrels headed up tight.

Having thus secured the first day's beef, in barrels, to drain (or pine) ; on the third day, other 14 beeves were killed, and managed in the same manner. Six posts framed into plates of timber on the top, were erected high enough for the beeves to hang clear of the ground. The entire carcases were slid back on the plates, one after another as they were dressed. The two front posts had holes through, at the sides and front ; by which with handspikes, or levers and iron pins, the beeves were raised and dressed, a pin-hole or two at a time, without rope or pully.

Coarse salt, *washed* but not ground, having also been previously ready, is dissolved in fair cold water till no more can be dissolved on stirring. Let it settle a day or two : skim off the top : pour off all but the dregs ; and keep it for use as below.

The meat is to be taken out of the barrels ; *re-salted*, and closely *repacked* in the same barrels. Immediately head them up perfectly close ; to remain so, till sold or used. In a few days after heading up the barrels, bore a hole in one of the heads,

or

or the bulge, of each barrel, and fill it up first with the *prepared* and *boiled juices of the meat*, saved from the first salting and barreling, as under mentioned. Every time of filling, the barrels being rolled leaves room for more liquor. When there is no more of the *prepared juices*, the barrels are next to be repeatedly filled with the plain strong brine, made as above, from the washed coarse salt, till they can take no more after standing a while.*

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* It may be sometimes requisite to kill cattle in the hottest weather. A farmer's ox or cow may chance to break or slip a limb—"Beef at *mid-summer* has been well preserved as follows.—The ox killed one day, and cut up and salted the next day. The salt, beat very fine, was well rubbed into the meat, which was then pressed into a cask with sprinkling of salt between the lays. It thus stood 48 hours, when from the close packing the bloody juices appeared above the meat, and they were poured off. Then a brine was made so strong that the water could dissolve no more salt. The meat was washed in this brine, and again well salted, as before; and lastly, the casks were filled up with the brine. Related by a Capt. *Norris*, who had often seen meat so preserved." *Collins on Salt and Fisheries*, p. 16. In Maryland, a Capt. *Binny* slaughtered beeves in *August*, and salted the meat into barrels, as provision for his seamen.—He immediately sailed with it on a voyage to *Barbadoes*: what of it remained he brought back to Maryland, perfectly good. The cattle were killed from the pasture, one by one, and immediately cut into pieces, and thrown into tubs of cold water for cooling the meat; the water often renewed. When the meat was cool, it was drained, and instantly salted. The pieces were then packed and pressed

I believe then *juices* of meat cured with salt, and the *boiled*, are of an excellent mellowing quality. All that can be saved, is therefore to be so *boiled*, and poured cold and clear on the meat in the barrels as above. When animals fast long, the blood and juices retire from the extremities to the large blood vessels in the centre of the body, in proportion as re-plenishment is withheld and the animal is weakened. Hence it is that the animal bleeds so much freer, and more plentifully, after long fasting. Here as in preserving fish in barrels, the operations are distinctly, to *salt*, and to *cure*. (See the Dutch mode of barreling herrings, page 418) and the *boiled juices*, from the salted meat, must serve to beef what the pickle of fish cured is to the herrings. On boiling the blood and juices with the pickle, the firmer parts settle in a mass on standing, and the liquor pours off clear.

Let not the barrels of meat be exposed to the sun, as is often the case, by rolling them out of doors and leaving them there longer than need be. *Damp* is bad for salt meat as well as for fresh ; therefore store the barrels in a *dry* place, the *coolest* to be found. It is recommended to cut up beef with a long, sharp knife, having a steel plate back saw ; with this to saw the bones, instead of mangling with an ax : that the pieces

close into barrels, and headed up. This account I had from Capt. Binny ; and also from my brother, for whom Capt. Binny failed.

pieces be but 4 to 6lbs. that to a barrel there be used, besides sea salt, *sugar* 2 or 3 lbs. the coarse brown sort; *salt petre* 4 ounces. It is observed that *Irish provisions* are in demand throughout Europe: In the size of the pieces they differ from the rest of Europe, which gives a preference; and it is especially in cutting their pork into pieces of 4lbs. to suit small messes; about 50 pieces to a barrel of 200lbs. It therefore is in greater demand, and bears a better price.

As coming from the intelligent Admiral *Knowles*, and as it is meant of meat for the use of the British navy, which required the best provisions, the following must be worth some attention. He says, skin and cut the ox into pieces fit for use, as quick as possible, soon as killed, and salt the meat whilst it is *hot*. For which purpose salt petre and bay salt are pounded together and made hot in an oven, of each equal parts; sprinkle the meat with this at the rate of two ounces to the pound. Lay the pieces on shelving boards to drain 24 hours: turn them and repeat the same, to lay 24 hours more. Wipe each piece dry with coarse dry cloths. Common salt made hot in an oven is then taken out and mixed with one third of brown sugar. Rub the pieces well with this mixture and pack them into barrels, allowing $\frac{1}{2}$ lb of the mixture to each pound of meat. It will keep good several years. The same process is applied to pork, only

only giving it more salt and less of sugar. The preservation of the meats depends equally upon their being *hot when first salted*. One pound of beef requires two ounces of salt petre and two ounces of bay salt, because it is to be sprinkled twice; an ounce of each to a pound of beef both times. Yet beware, and first make experiment.

F A L L O W S.

Mr. *Forbes* has a good chapter on fallows: and the Bath Letters speak of a comparative experiment between fallow left *rough from the plow*, through winter, and some that was *harrowed after the plow*. This last proved much the best in a barley crop sowed the following spring. In an entire field of wheat, a part of the seed was *plowed and then raked in*; another part *handhoed* after being plowed in, as usual when sown amongst maize plants; and a part left *rough* after being plowed in. This last was so superior that (and from other particulars and instances of smooth dressed ground compared with a part in its rough state as left by plowing in the grain) I afterwards generally left my wheat untouched on being plowed in, without raking, harrowing, hoeing or rolling the ground. On the other hand it proved on an experiment I made, that a part fallowed and then harrowed smooth and so left through a winter, was preferable for receiving seed

seed and giving a *subsequent crop*, to what was left rough. Such, so far as these experiments were made, is the difference between *fallow* and *sown* ground being *smoothed* or left *rough*: the soil a clay-loam.

LETT SOM's YEAST.

Doctor Lettsom in his Hints for promoting Benevolence, says—“Thicken 2 quarts of water with 4 ounces fine flour; boil it half an hour. Sweeten it with 3 ounces Muscovado sugar. When *almost cold*, pour it on 4 spoonfuls of yeast into an earthen or stone jar, deep enough to allow the yeast to rise: shake it well together, and place it a day near a fire: then pour off the thin liquor at top: shake the remainder, and close it up for use. It is to be strained through a sieve. Keep it in a *cool* cellar, or hang it some depth in a well.—Some of it is to be *kept*, always, for renewing or making the next quantity wanted.”

I had a German brewer, in my family, who used to keep family yeast in a *cask* bottle; and he poured half a gill of brandy, very gently, to float on the top of the yeast, in a *cask* bottle containing about two quarts, for excluding the air. Whenever he found his yeast was inclined to be flat, he mixed in it half a gill to a gill of brandy, according to

to the quantity of yeast left in the bottle ; and letting it stand a while, shook it up again and then used it. The best brewers *strong beer yeast*, I presume should be begun with : and then a good bodied rich yeast may be kept up, by renewals.

POTATO-YEAST, by Kirby.

The principles in this, are allied to the preparations for producing Anderson's potato spirit. Kirby recommends the *mealy* sort to be boiled till thoroughly soft ; mashed till very smooth ; with hot water put to the mash, till of the consistency of beer yeast, and not thicker. To every pound of potatoes add two ounces of coarse sugar or molasses. When but just warm, for every pound of potatoes, stir in two spoonsful of yeast, and keep it gently warm till done fermenting. He says, a pound of potatoes yields near a quart of yeast, to keep three months : and he directs that the dough lie eight hours before it be put to the oven. This shews that the ferment, however sure, is slow. I would have the potatoes to be thoroughly *ripe*, and well *sprouted* ; for the reasons mentioned under the head of potato spirit.

PERSIAN-YEAST.

A tea-cup full of split or bruised peas has poured on it a pint of boiling water, and is then set on the hearth

hearth or other warm place, all night. Next morning the water will have on it a froth, and will be good yeast. This quantity makes as much bread as two six-penny (sterl.) loaves; very good, and very light. It is the yeast used on the coast of Persia.

CASTOR OIL.

Though this mild family purgative is produced in quantities in some of the islands in the West Indies, yet it is sometimes hardly to be got in the shops, in the United States, or is very stale. It is produced from the seeds of the *Palma Christi* plant, common in our gardens. There are two sorts in this country; but that which has been long known, is the most common, has a *light or bluish colour'd stalk*, is the sort used in the West Indies, as I am assured by a respectable family from thence, who add, that the *Palma Christi* having a *reddish stalk*, is never used, it being suspected of having harsh if not poisonous qualities. Further they say, that of the two modes of procuring the oil, that by *expression* is preferred.—Yet *Labat* and others prefer *boiling* the seeds. The reddish sort was but lately introduced as a curiosity in a garden near Philadelphia.

Strip the nuts of their husks. Boil them in water; and as the oil rises skim it off. When it yields

no more to the water, press the grounds wrapped, loosely, in a coarse cloth. This oil is sweet, without bad taste or smell, and as clear as olive oil. *P. Labat.* Bruise the seeds, and boil them. The oil skimmed off is much purer, and is capable of being kept longer than what is obtained by *expression*; because the *water* *detains the mucilage*, which is in a large quantity in the expressed oil, and which disposes it to spoil sooner. Edinb. Dispens. An. 1794.

Dr. Simmons says of *Palma-christi* and its oil, in Dr. Wright's book of Medical Plants in Jamaica, that when the bunches begin to turn black, they are gathered, dried in the sun, and the seeds picked out and put up for use: that the best preparation of it is thus: a large iron pot is half filled with water; the nuts being beat in parcels, in deep wooden mortars, are then thrown into the pot, and gently boiled two hours under constant *stirring*. The oil then swims mixed with a white froth, and is skimmed off till no more rises. The skimmings are heated in a small iron pot, and strained through a cloth. When cold it is bottled up. *Thus made* it is clear, and well flavored. An English gallon of the seeds may yield two pounds of oil, which is a large proportion. In lamps it burns clear, and has no offensive smell. It answers all the purposes of the painter, and for ointments and plaisters. It purges without stimulus, and is given to infants to purge

purge off meconium. All oils are noxious to insects; and the castor oil kills and expels them.—It is given as a purge, after using the cabbage-bark some days. It is remarkably successful in constipation and belly-ach; sits well on the stomach; allays the spasm, and produces plentiful evacuation, especially if at the same time fomentations or warm bath are used.

TURNIP-FLY.

It is said to be a successful method of avoiding damage to young turnip plants by flies, to mix every two pounds of seed with a quarter pound of sulphur in fine powder, to stand ten or twelve hours; and then sow the seed. Quere: would wheat, when the seed has been so treated with sulphur, avoid the Hessian-fly?

CHEESE.

Mr. Twamley was many years a great dealer in cheese, annually visited the dairies of Gloucestershire, Wiltshire, &c. and bought the cheeses of entire choice dairies. He made observations on the practices of the cheesemakers; and says that the principal faults in the cheeses of those countries, made in inferior dairies, were there being hove, spongy or full of eyes, whey-springs, shakes, splits, loose or made

made of unsettled curd, rank or strong, flying out or bulged at the edges, dry-crackt or husky coated, blistered coats, blue pared or decayed, sweet or funky, ill-smelling from tainted maw-skins. Be careful that the rennet is perfectly sound. “ There is no making good goods of bad materials.”

A very great fault is the *hastily breaking* and *gathering* the curd, and *setting* it; each of which requires minute attention and *full time*. Of curd, see pa. 422.

Driving cows far, or carrying milk far, retards the coming of the curd; so much so that instead of an hour or two, it will require three, four, or five hours; and even then the curd is in so imperfect a state as to occasion the cheese heaving, puffing up or splitting: and it will not answer to add more rennet for quickening the coming of curd that is too slow.

The proper warmth of milk when receiving rennet is only milk warm; or perhaps rather about 85 or 90 degrees of Farenheit. If it is too cool, add some *warmed milk*, but let it not boil in warming. If it becomes too cold after the rennet is put to it, add *hot water when the curd is nearly come*; which will give a due firmness to the curd. But it is of importance that, before the rennet is put to the milk, there be thrown into it at the rate of two handfuls of *salt*

to the milk of ten or twelve cows; which will tend to make the rennet work quick, prevent sweet or funky cheese, make the cheese all alike salt, and prevent slip curd, by occasioning the curd to be firm and sink readily and equally. Mr. *Marshall* adds, for making the curd come all at the same time, *cover the milk* with a cloth whilst the rennet is in it.

The great fault, continues Mr. *Twamley*, is in disturbing the milk too soon, before the curd is perfect. It is first a weak soft curd called *slip curd*; in which state it is unfit for making good cheese: when it stands sufficiently long after this state, it becomes a firm perfect curd fit for cheese. In whatever state it is when it is first broke or stirred, in that state it will continue; and can never be made better by adding rennet or other means.

Neglect not to put *salt* to the milk when the rennet is about to be applied; and instead of an hour let the curd be undisturbed during one and an half or two hours, or more if requisite for obtaining a full, firm, and perfect curd;—and *sink* the curd with a sifter rather than break it. For sinking it, a long wooden or lath knife is to cut the curd from top to bottom, crossing it many times; then with a sieve pres^s it down: when having settled it well down, let it *rest* a quarter hour. The whey being laded out, the curd lies solid: then *cut in slices*, and work it

it into the vat with as little breaking it as possible. Breaking it small in the tub and into the vat reduces the cheese in quality and also in quantity; for the fat is thereby more apt to be squeezed out.

There are he says, persons making good cheeses, who might make better and more, if they did not *squeeze out* so much of the fat in breaking. The whey that first comes is the thinnest. If that thin whey was first *separated* before *breaking the curd*, it would leave the cream in the cheese, with the loss of but very little squeezed out in putting it in the vat: but when broke small amongst the whey the rich parts are squeezed and washed out among the thin whey. Where there are bits of slip curd floating on the whey, they are taken off and carried away with the whey, as they would damage the cheese. The best cheesemakers let the curd stand *two hours* instead of one and an half; by which the curd becomes so firm and perfect that it needs no more than to be cut and sliced, put in the vat close packed, and then to the press. A good whey is greenish. It is reckoned on, that the milk requisite for making one pound of butter, will yield two pounds of cheese.

RICH CHEESE.

New milk makes the fine cheeses for market, without any addition of cream: but a rich cheese

for high days, has “ a meal extraordinary of cream “ added to the new milk. Care must be observed “ that the curd should not be sunk in less than two “ hours : two and an half or three hours may be “ better.”

SLIP-CURD CHEESE.

“ To six quarts of new milk warm from the cow, the strokings best, put two spoonfuls of rennet, to stand three quarters of an hour, or until the milk forms a sufficient *slip-curd*. With a spoon lay it in the vat, without breaking it, and place a trencher or flat board on it. Press it with a four pound weight ; or if it inclines to be hard, a lighter weight, turning it with a dry cloth once an hour ; and when stiff shift it daily into fresh grass or rushes. It may be cut in ten or fourteen days. Its best condition is to have it run or dissolve into a creamy consistence.” Nothing but weak *half formed curd* called slip-curd will produce it. It is the cream cheese of Philadelphia.

RENNET-BAG OR MAW-SKIN.

“ Rennet is the produce of the stomach of a calf that has fed on milk only ; and the calf killed before the digestion is perfected. Though this rennet readily

readily coagulates milk, yet if put to milk already coagulated, it then dissolves it.

“ Soon as the maw, taken from the calf, is cold, swill it *a little* in water : then rub it well with fine powdered salt ; next fill and cover it with salt. Some cut the stomachs open and spread them in salt, in layers one over another, and let them lie in the brine they produce ; sometimes turning them, four, six, or nine months : then they dry them stretched out on sicks. When dry, use them. They are best to be a year old when used. Keep them distant from fire, for avoiding rancidity.” *Twamley.* A dry cool place is best. See pa. 421. Never use any that is in the least tainted.

RENNET-LIQUOR.

“ Take two skins to a gallon of pure spring water : the water having been boiled and made into a brine that will strongly bear an egg. When the brine is made blood warm, cut the skins into pieces, and steep them in the brine twenty-four hours. It may then be used ; about a tea-cup full to the milk of ten cows : but observe that a just quantity be applied : for if *too much* the cheese becomes strong and liable to heave ; if *too little* the cheese will be mild, but the curd will be a long while before it can be properly broke or funk, and may become damaged *before it is*

is firm enough to be committed to the pres. The liquor is kept cool in jars or bottles. The Bath Letters say, in the brine boil sweet briar leaves, rose leaves and flowers, cinnamon, mace, cloves and other aromatics, briskly till a fourth is reduced : pour it *milk warm* on the maw skin and slice a lemon into it. Then standing a day or two, it is strained and bottled close.” Twamley. See pa. 422.

M A N U R E.

The headlands of arable fields, along the sides of fences, accumulate soil from the fields on every bout of the plows. This accretion of soil confines water on the fields so as to chill them, and damage growing crops. For reducing this mischief and increasing manure, plow up a portion of the headland and then *pen* cattle on it, till it becomes very rich with dung and urine. Then having another portion recently plowed, pen the cattle on this in like manner ; and the former portion is again plowed for covering the dung and mixing it with the earth ; which is then either immediately carried away, and as a manure laid on other ground, or heaped up high and covered from the sun, to remain so till wanted for manuring ground. During the summer, and till cold weather forbids, other portions of the headlands are to be plowed and penned with cattle in the same manner in succession. This is preferable to *cow-penning* on lots for

for tobacco, as is practised ; and it is making a *compost* without carting the earth to a dunghil or yard.

G R A S S,

—The *fine qua non* of LIVE-STOCK ! the essential of DUNG ! the nursery of CORN, and of all FARMING PRODUCTS !

H E A T — I C E.

" When we entered the Seminary at Syracuse, says Count *Stolberg*, the heat was not extreme ; but when in less than an hour we returned, it met us hot as if it came out of an oven, we being then in the open air, unprotected by shade. It continued thus hot about three hours. We were advised to *shut up* our windows, leaving only light to read by, and *sprinkle our rooms with water*. The air in the house thus became supportable. Farenheit's thermometer ascended from $81\frac{1}{2}$ to $101\frac{3}{4}$ degrees. We durst not leave the house all the afternoon ; but *cooled* ourselves with *ice* ; and strengthened ourselves with wine. The practice of taking *ice*, in Italy and Sicily, is considered as an indispensable refreshment ; and as a powerful remedy in many diseases. The physicians of these countries do not give many medicines ; but frequently direct a severe regimen : and prevent the ill effects of various diseases by suffering the sick, for several

several days, to take nothing but water cooled with ice, sweet oranges, and iced fruits.—Iced milk, fruits, chocolate, and other iced viands, are found in most of their towns. They prefer snow, as it is more easily preserved than ice. The snow is closely packed together, and covered with straw.”

POTTERY.

The earthen ware made in America, is glazed with lead: and the glazing composition is laid on very sparingly, thin and slight: so that it is not only worn away by vegetables and every thing acidulous, but is apt to scale off and be swallowed with meat, greens, and drinks. It is pure lead, and consequently a strong poison. The effect of lead on the health of glaziers and house painters, is daily seen. A journeyman or working painter may live, continually dying, six or eight years as a large allowance. The master who sees that the work is done, and works but little, lives longer. All are groaning and pining, under colicks, gripes, cramps, rheumatisms, aches and pains, who continue to snuff up and inhale the vapours of lead for some time; or who gradually swallow small portions of it with their milk, greens, cider and drinks, diffused from the glazing made of lead. The people of New-England, drink much cider, and use much vinegar, in country families;

lies ; and there have been instances of whole families afflicted as above.

Lead requiring but little fuel to melt it, is the cheapest or easiest material for producing common glazing. It is therefore imposed on the inattentive people of the country, who buy the ware without knowing its bad qualities, or without caring for them : and this lead is imported from foreign countries ; whilst our own country abounds in materials for producing the most perfect, durable, and wholesome glazing. These materials are *wood-ashes* and *sand*. On conversing with a potter in Philadelphia, his objection to the use of these matérials was their requiring more labour and fuel ; but if I would prepare them for glazing any pieces I might want, he would lay them on, and find a place in his kiln, for giving a good glazing. If legislators were duly sensible of all this, their energy might find means for causing the change from *lead* to *sand*, for glazing earthen ware ; and of course, for protecting the health of the people.

A young man of the name of Cook, a brickmaker, in the time of the revolution war, informed me he would erect an earthen ware manufactory, if he knew how to glaze the ware. Having a small air furnace, for my amusement, he made small clay cakes, and the glazing materials were prepared and laid on the dry

dry cakes: and being fluxed in the furnace, the glazing was very satisfactory to him. He then got some fine *potters clay* out of my bank, and made a number of little cakes of it, mixt with various proportions of *ground sand*. These were burnt in the furnace; and one especially was a specimen of a very excellent *stoneware*: which is vastly preferable, in its qualities, to earthen ware; and is greatly wanted in America. The heavy freight paid on so *bulky* and *cheap* an article of imported merchandize, renders *stoneware* scarce: and gives an inviting opening to industrious manufacturers of stoneware, in America.

SEASONING WOOD.

Wood seasoned by the *air* is left in the same state as if seasoned by *water*; which is with the loss of its sap or juices, being washed or evaporated away. It is sooner effected by water than by air. The wood, then, only consists of its fibrous and solid parts; which are considerably concentrated by being dried: yet the mass is not without numerous interstices, from whence the sap had been expelled by the air or the water. In dry weather these contain little else than dry *air*: but in moist weather they become charged with humidity from the atmosphere to such a degree at times as to swell and even burst boards so season'd.

Shrinking

Shrinking and swelling of boards happen according as moisture is absent or present. If seasoned wood can be defended from the impressions of water, it never will swell. I effected this when painting a landscape on seasoned poplar, which warped or became straight according as were the changes in the state of the atmosphere. I covered the back the sides and the ends well, with painters drying oil, at a time when the board was straight, and it never afterwards warped.*

Wood seasoned by fire with *quickness* whilst full of sap, does not imbibe water, as air and water seasoned wood; because, as it seems, the sap is insipidated by the sudden heat so as to fill or mostly fill up the interstices; and being so fixed and hardened, it excludes water. The sap thus cured, is prevented from fermenting and rotting the inside of the wood, and from flying off in vapour.

A pair of cart wheels, soon as made were tarred over thick and set up resting on the side of a house a year or two. When put to use the fellows broke and shewed a sound external surface, and the rest a dark,

* " Equal parts of rosin, turpentine, and bees wax were melted together, well skimmed, and with a brush laid boiling hot on a board 6 feet long, 18 inches wide; which was kept in water 19 months, without having imbibed any water, or having its coat of cement damaged." 2. Rep.

dark, rotten, coarse powder. Here the *unseasoned* wood being coated over so as to obstruct the sap from evaporating, the sap *fermented*, it is presumed, and rotted the inside of the solid parts of the timber: the shell or outside of the timber having been seasoned, or lost its sap, before the tar was applied. In forests, I have stept on the bodies of prostrate trees, which appeared sound to the eye: but have broke through the seasoned crust to a mass of rotten powder.

Sleeping in a room of a one story brick house then lately built by a Doctor Wharfield, of Elkridge, Maryland; in the morning I admired the wainscoting and ceiling of the room, which were made of poplar boards; in which the joints could not be easily discovered. The work was not painted.—I supposed the boards had been many years seasoning in a tobacco house. The doctor pointed to two lengthy pits, on the side of a hill; and said the trees were felled and cut off into logs, which were immediately hauled to the pits, over one of which a log at a time was sawed into boards or planks, and immediately, whilst *full of sap*, a fire was made and kept burning under the stock till the boards were cured; and that some of the wainscot was put up within two weeks of its having been in the growing tree. The pits were alternately employed in sawing the logs, and firing the stocks.

Recommending

Recommending to a ship carpenter, the trimming timber roughly in the woods, and there seasoning the pieces by fire, he objected it would render the timber hard to cut and dub. Perhaps too some might think it would render the timber too durable. It may be proper to contract for its being so seasoned: especially for national ships.

Melasses and Muscovado Sugar Cleansed.*

Weight, 24 melasses; 24 water; 6 charcoal thoroughly charred. Bruise the charcoal grossly. Mix the three articles in a caldron; letting the mixture boil, gently on a clear woodfire, half an hour. Then pour it through a straining bag; and place it again on the fire, for evaporating the superfluous water, till the melasses is brought to its original consistence. The loss is scarcely any. 2. Rep.

SALTING AND CURING MEAT, IN ENGLAND.

According to 14 An. pa. 267. meat for family use, in England receives 1lb of salt and 1oz. nitre to every 14lb of meat. The salt and nitre to be beat fine. Rub them well into the meat. Lay the pieces

* A syrup of the consistence and sweetness of *honey*; and produced by the labor of *asses* in grinding sugar canes: thence melasses from *mel* and *assus*, or *asses*.

pieces on each other, during a month, and turn them once a week. Then drain, and shake bran [perhaps better if impalpable clay or ochre] over them, for absorbing the moisture. Hang the pieces in a kitchen. If the quantity is large, then in a room having a stove and flue round it. It is a month in drying—then keep it in an *airy, dry room*.—For voyages and hot countries, soon as dried pack it in *saw-dust*, stove dried.* *Moisture* is more to be apprehended than heat. In common the longer meat is kept in brine the fatter it is; but in this method it never varies.—Salting for *ship use* the salt is 1lb. to 8lb. of meat; besides $\frac{1}{2}$ inch thick of salt in packing. See p. 406. and of Pork cured in ochre page 437.

M A I Z E.

Farmer *Shephard*, of New Jersey, informed the Burlington Society of Agriculture, that in autumn 1786 he collected, for seed to his next year's crop, a quantity of corn produced *on stalks which produced two ears*. The crop from that seed, was increased much beyond what he had been accustomed to, even to 10 bushels an acre: and by following the same rule in saving seed, his crops increased to 60 bushels

* Perhaps still better packed in an astringent and very dry pure clay or fuller's earth.

bushels an acre; with three or four ears upon a stalk.

The husbandmen of America would do well to try the method of cultivating maize as practised in Italy, France and Spain: where it is sown very *thick* in broadcast, for producing *fodder*, and for *stall feeding* or *soiling*; and when for a *crop of corn* is planted in squares of two feet: and even then blades are daily pulled and given to the cattle; which Mr. Young says accounts for the very high order of all the cattle in the south of France, in Spain, and in Italy, in situations clear of meadows. Planted at two feet there are 10400 *hills* an acre, or 20800 plants when two remain in a hill. In Maryland are about 1500 hills having two to three plants each. In the country of New York, in August I admired a field of maize, seemingly growing $2\frac{1}{2}$ feet apart, perhaps 3 feet, with two or three plants in a hill. It was the only field I saw of that appearance; so near growing, so stout rather than tall, green and vigorous, casting a considerable shade on a clean mellow ground. The ears and tassels were but just peeping out. By information their ground commonly yields more maize by the acre than the ground in Maryland. The former always manure for maize, the latter do not. It still is surprising to me that maize growing so close,

should

should yield so greatly, but it is well to make fair experiment.

WASH, FOR BOARDS OR STONE WORK.

In Nova Scotia they wash rough boards, the rougher the better, with a mixture of stone lime slack'd with boiling water, whiting, alum, common salt. The *alum* is an excellent article for *binding*; salt also would be unexceptionable, but that it attracts moisture and *gives*, as it is called. The above promises to be a good *white-wash*.

A *Black-wash*, which I have experienced effectually *resists water*, is made of tar three or four parts, and fish oil one part, intimately mixed in a pot over a slow fire; which is laid on hot with a brush. Such brushes, bound with iron rings, are to be got at shops for shipping. For giving it body, add impalpable clay or ochre.

A *grey-wash* may be produced, by adding more or less of the black-wash with the white-wash: but I would omit the salt, as doubtful; and the alum, as unnecessary, where so binding a varnish as the black-wash is admitted.

I have seen a simple, cheap varnish of turpentine, used in ships: but know not how it is made. Perhaps,

haps, as that of tar with *fish oil*.* This varnish mixt with the white-wash, it seems would produce a wash excellent in quality, and of a cream colour.—This may be laid on plastered walls, floors, and platform-roofs, for excluding moisture.

There is great neatness in well plastered and white-washed rooms; easily renewed in country places; but town fashions generally prevail over this rural method of finishing and renewing rooms in country habitations. Where objections are made to the glare of white, this glare may be blunted by adding to the wash a very little of some other colour. In painting on lime-plaster, perhaps spirit of turpentine or linseed tea are better than oil.—

P A U P E R S.

As a forerunner to promoting *employment*, be bold in amending the existing regulations respecting the poor. Principally provide *checks* on the *magistrates* and *overseers*; who through levity, weakness, or other cause, suffer their country to be shamefully abused, in at least some of the United States; and involve in their *lax* government a marked encouragement of some of the greatest evils that can enfeeble nations or affect mankind—*Idleness* and *de-*

G g bauchery,

* It is said to be produced from a mixture of turpentine and rosin.

bauchery, with their companion *wretchedness*: for, John will be at *ease*—will be *idle*—will be a *sot*, because John can *whine* himself into the society of public paupers, and there be provided for, as a drone, at the expense of the industrious and sober citizens. The laws provide for the poor,—not for the whining impostor: and it is desirable that they be provided for; but they should also be kept to some *employment*. Paupers capable of but whittling a stick, may be induced to pass their time in producing toys for other people, as the Germans in Europe are used to supply our babies, little and big.

A steadiness in work, of any sort, according to the abilities of the respective paupers, would lessen the public burthen; both by the income gained from it,—and from impostors shrinking from a compulsive work under *confinement*, when they can, unconfined, find work *at large*.

The best support the poor can receive is from their own endeavours. Every allowance made them which renders their working in any way unnecessary is a premium to idleness. Employment, not alms, should be found for them, who can at all work; and it is well observed that one shilling earned by the pauper, renders him more material service than ten given him.

Want

Want of a right criterion for admitting applicants, to be provided for at the public expense, is the principal cause of a great number of them being in reason, in humanity, policy and in justice, *improperly* received. That a man is *poor* is not alone sufficient cause for the servants of the public providing for him at the cost of the industrious and sober part of the community: besides his being in a state of indigence, he must be *incapable* of working *somewhat*, sufficiently to support himself in *necessaries*; and also he must be without any *connexion* capable and compellable by law to provide for him. Indulging a whining drone, *capable* of procuring common necessities by labour, or in any way of employment, is encouraging the *vices* above enumerated; and in effect multiplies *paupers*, *vices* and *wretchedness*.

SOLID FEET REDUCED TO BUSHELS.

The foot contains 1728 inches. The bushel *in use* 2183 inches. For the farmer's estimates and gross purposes, it will be near enough though not quite exact, to reckon for struck measure, the feet $\times .8$

How many bushels of wheat will a room of
1000 solid feet hold?

.8

800.0

800 bushels :

G g 2

which

which is but about one per cent short. But to multiply by .791, is very exact.

.791

1000

— 791 bushels exactly.

A cart body containing 40 feet

.791 .8

40 —32.0 bushels,
— struck measure.

31.640 or $31\frac{64}{100}$

M A D D E R.

Madder and water-rotted green hemp would be agreeable, as well as profitable crops, for retired cits to amuse themselves with cultivating them on their small retreats, if they should wish for more than grass to employ their attentions. Mr. Arbuthnot in England, cultivates the amazing quantity of 80 acres in madder, on his farm of less than 300 acres. I was much pleased with the growth and produce of a bed of Mr. Arbuthnot's choicest kind of madder in my garden at Wye; and wished to spread the culture of it amongst country families, who appeared the most concerned in little domestic manufacturing. But alas! only one family desired to have of it; and planted some roots, in their garden: and at this time, 1801, it is preserved in a garden in Talbot, Maryland.

ASSES.

A S S E S.

“ There are two sorts in *Arabia* : the smaller or *lazy* *afs*, as little esteemed there as in Europe ; and a *large and high spirited breed*, which are greatly valued, and sold at a full price. I thought them fitter than horses are.” 2 Neibuhr’s Trav. in Arab. 304. This finer breed is also spoken of by Sonnini, ch. 35. Where it is said that the greater part of Egyptian asses have a bright gray coat ; and some have black and others reddish stripes. “ Eminent he says, in her breeds both of *horses* and *asses*, it was natural for Egypt to boast fine mules. There were some of these *mules* at Cairo, far superior, in price, to the finest horses. They were preferred for the *priests* and officers of the revenue. Their pace was an amble with very long steps, to which they were brought by fastening each fore foot to the hinder, for some time. The handsomest asses at Cairo come from upper Egypt and Nubia : the higher up the Nile, as in *Saïd*, the beauty is the greater.”

The common breed in Egypt and Syria, says 1st Frank. Hist. Egypt, is much larger than what are ever seen in Britain ; and another yet larger breed is preserved for the saddle. Almost all the common people in Egypt, and all christians and strangers whatever, ride on asses.—The best sort bear a high price.—They are tall, handsomely formed, go swiftly,

ly, in an easy ambling pace or gallop, and are remarkably sure footed.

G A T E S.

The best farm gates on my farms, were thus constructed. The posts were sawed square off at the tops ; and were but 4 feet 6 or 8 inches high from the ground. The top of each post inclined 4 inches inward toward each other. Their distance on the ground was 9 feet, of course the distance at top was but 8 feet 4 inches : and this inclination seemed to influence oxen and horses, in carts, to take more to the middle of the passage. Gluts of wood, large and stout, were trunnelled to the posts and let into the ground ; which served as fenders and braces. These fenders also tended to direct beasts to the middle of the way.

Gate posts ought never to be higher, if so high as the cart wheels ; that plain frames holding hay or straw may pass over the posts.

When posts are thus inclining to each other at the tops, the *gates* will be narrower, by 8 inches, at top than the bottom ; and of course lighter than if of the square of 9 feet, as at the bottom ; and as they are opened they rise gradually from nothing to 4 inches ; and then being let go, gently fall to their station at the post.

My

My gates had been widened from 10 to 11 feet, by an honest Hibernian much my friend, that the carts might be sure to pass through without striking the posts: but alas! the drivers became more careless, and the cattle were left to their own bias. These posts 11 feet apart were more cut than those of 10 feet as the 10 feet were more than the 9 feet. These last were indeed scarcely touched—the fenders, &c. preventing it. See the Plate.

P L O W S.

A habitual fondness for *wheels* has greatly lumbered and depreciated the plows of England. Ingeniously built Norfolk wheel plows have been imported into America; but were very soon laid aside. In opposition to this huge complex machine, the English Rotheran patent plow is every thing: a simple, chip, swing-plow with a clean but full bow mould board. The share and mould board are superior for cutting and turning old lay or grassland: but in horsehoing it is inferior to the common bar plows of Maryland and Pennsylvania, as it requires more use of the plowman's hands. The common fault in the American plows is mostly in the mould board. Almost any mould board, would be preferable to the *hollow* fine shaped board which the fancy of some delight in; as injudicious watermen prefer the sharp entrance and *hollow* forepart of the bottoms of sailing vessels. The plow and the boat have to force their way through

through resisting mediums. For gaining this, sharpness of entrance is all in all with heedless fancy.

But what avails this first clear entrance, if opposition in a more abrupt and direct manner, a little further aft is the consequence? View the *hollow* mould board of a sharp fair looking plow, after it has been worked a while, or whilst working, what a glut of friction or opposition it has experienced, just in the hollow, and how it labours through accumulated masses of earth unthrown off forward. On the other hand see the mould board having a fair easy entrance and full bow in a gradual swell as it rises, how it turns off the earth and rids itself of avoids accumulated resistance, just as a well formed boat does the water; and this with the least possible friction or wearing of the mould board! Illustration: designing to spend a winter in Philadelphia, it was proposed that Mr. *Singleton*, of Talbot, should procure to be made a double plow to carry two furrows at a time, and that I should have one made at Philadelphia, where, in Arch street, was an ingenious plowmaker. On comparing Mr. *Singleton*'s with mine, the weight of mine ready for work was 96^{lb}, wood and all: his 43 to 45^{lb}. His had the admired fine light *hollow* mould board; mine the comparatively heavy looking full bowed mould board. My plowmen, were horsehoing maize, when I ordered the two best to try the double plows with two horses to each. Seeing them at work for some time, they were ordered to change

plows

plows. After working these awhile, they were asked separately, their work being sixty yards apart, which they liked best. It was curious how they for some time looked at one and then at the other plow, before they answered. Their conclusion, respectively, was that the large plow was best : but that it was heavy in swinging round. It did not appear to them or to me that the horses exerted more power, or were more worried, in carrying the large than the small plow. The plowmen were obliged constantly to press on the stilts of the small plow, but not of the large one : and whilst we were talking the horses went off with the large plow, which followed them steadily and without deviation as if the plowman had hold of the stilts and leading line, for 70 or 80 yards. Both were bar swing-plows, for we see no use in wheels to plows : but the Philadelphia plow had a longer tread. The Talbot plow was shorter than common which with the *hollowness* of the mould board deprived it of steadiness and a due balance. Neither Mr. Singleton or myself gave any direction in making the mould boards.—Having worked mine one season, with approbation and some admiration; a new overseer would improve my large plow, by cutting away the *swell* of the mould board and leave it *hollow*, that it might pass easier through the ground. It was done ; and the plow performed very indifferently : it was worked thus a few days and laid aside.

A promising mould board, formed on mathematical principles, is lately invented by Mr. Jefferson; of which an account is given in the fourth volume of American Philosophical Transactions.

T U R N I P S.

Mr. Amos says, “on poor soils 10 inches are the best distance: on rich soils 12 inches, and one inch the best depth. When they stand at a greater distance, they grow too large for keeping long. The smaller the turnips the longer they resist the severity of winter.” Too early sown or planted turnips or cabbages do not stand the winter well: they are over ripe, spongy, and susceptible of frost; having less of the *vis vitæ* of their nature: their vigor is spent, which would withstand frost. But the more hardy Swedish turnip, called *rutabaga*, is sown in April or May for giving the full grown *bulb* in autumn.

C A R R O T S.

In Mr. Young’s Agriculture of Suffolk, it is said the most approved method is to leave a barley stubble, which has followed roots, through the winter; and about 25 March to plow by a *double furrow* as deep as may be; and to harrow in about 5lb. of seed an acre. About Whitsuntide hoe the first time; and thrice in all, at 4 dollars an acre. The produce on good land, 400 to 500 bushels: sometimes

800. On poor soils as low as 200 bushels. The carrots are commonly left in the ground during winter; and taken up as wanted: but in some winters they are frosted and rot. The feed is 80 bushels a week to 6 horses, with chaff, but no corn; and when so fed very little hay is eaten.* Yet it is best to take the carrots up in autumn and pack them in a barn. There they acquire the *withered state*; in which they yield *most nourishment*; and late feeding is better than early in the season when they abound in water.—Carrots put horses in better condition than *corn with hay*; and they leave oats for carrots. Feed with them from Christmas till a full bite of grass in May. One bushel with chaff, is enough for a horse a day, without corn, and saves half the hay. The preparation they give for a subsequent crop, fully pays for them.

Mr. Amos proposes *drilling* carrot seeds. Two pounds of seed, steeped in rain water 24 hours, then laid on a floor till they sprout, with three pecks of dry saw dust, and three pecks of fine dry mould, all well mixed together, are drilled, one inch deep and 14 inches between the rows. Thus steeped and *sprouted* when sown, the plants begin to appear in 8 or 10 days. After drilling, harrow once, with light harrows; and then roll, if the ground

* Seven pecks of roots a day seem more than enough. It is presently afterwards said, one bushel with chaff is enough.

ground is not moist. As soon as the carrots are about 2 or 3 inches above ground, says Mr. Amos, they should be *harrowed*, the horses walking in the furrows, for avoiding to tread the land and plants. In two or three weeks after harrowing the *second hoing* is given to clear away weeds, and the plants are *thinned*. In 3 weeks again horsehoe the intervals, and handhoe the rows, as well as finish the *thinning*. Every other row may be taken up: the rest covered with a double mould board plow, and long dung, for standing the winter.

MODES OF SOWING WHEAT.

1. *Broadcast*: the most simple and most common.
2. *Drilling, in continued rows*; like garden peas.
3. *Drilling clusters*; in rows.
4. *Dibbling*: dropping seed in holes.

Broadcast can scarcely be hoed at all: nor is it done in crops. Harrowing might answer.

Drilled, like garden peas, it is *horsehoed* between the rows; and yields more than broadcast. *Drilled in clusters*, it is *horsehoed*, and may also be hand-hoed. It thus yields still more than the drilled in a continued line.

Dibbled, with a number of seeds in each hole, is probably the most productive: dropping not less than

than eight or ten grains of wheat to each cluster. Dibbling is tedious and expensive, where labour is scarce, though it is mostly the work of women and children: but the effect is very great, where some number of grains of wheat is dropt in each hole.

Mr. *Amos* made a number of comparative experiments, as well of seeds sowed *broadcast* as *drilled*: the result whereof shews, that *drilled* and *horsehoed* grain is superior to *broadcast* harrowed and handhoed, by 13 per cent; besides cheapness in the work, and the ground left in better condition. Drilled *turnips*, *horsehoed*, superior to handhoed 17 per cent; and the work cheaper, with the ground left in better condition. Drilled *potatoes*, *horsehoed*, superior to handhoed 16 per cent; the work cheaper and the ground left better.

In the above experiments, broadcast wheat was handhoed, which it scarcely ever is in entire fields of it. If, in the experiment, it had not been handhoed, the superiority of the drilled wheat might have been greater.

From experiments made by me at Wye, I estimate wheat growing in *clusters* to be 15 per cent better than drilled wheat in continued rows, both being hoed, &c. alike; which would be $\frac{1}{3}$ or 33 per cent better than broadcast wheat not hoed: and

and the growing crops of *clustered* wheat, are the most beautiful, the work easy, and the products the most abundant and perfect!

ROTATIONS.

Mr. Amos's are :

I.	II.	III.
Oats	Turnips. rot.	Potatoes 12 l. dung
Cole seed, <i>limed</i> with 144 bush.	dung 10 l.	Barley
Barley	Barley	Clover
Beans	Clover	Wheat
Wheat	Wheat	

The *lime* ought to enrich greatly : for coleseed is said to be very impoverishing, and beans are the only mild crop in No. I.—So the dung must be rich, and the ground previously in good heart, in No. II. as 10 loads are rather a small allowance to an acre. The like of No. III : but then No. II and III have two mild crops, rather ameliorating, to two exhausters.

DRINKING WATER.

In low flat countries, even in some districts of higher country, the water of springs and wells is bad tasted and bad in quality. Water in springs, which does not run rapidly, but is sluggish to being nearly

nearly stagnant, abounds in *putrid* remains of vegetables and insects. What are deemed springs of good, clear, sweet water, in these countries, are still but comparatively so. They want the brilliancy and the spirit of rock water, such as the highlands afford.

If filtering the water used for drink was practised, it would render what is so inferior at least bright and palatable ; and probably perfectly wholesome ; especially if charcoal should be applied to it as below. Of this and filtering, it may be observed that,

Purifying water may be performed in either of the following modes. According to Doctor *Lind*, a small cask open at both ends, is placed within a larger cask wanting a head. Clean sand and gravel is put into both, so that the level of the sand within the inner cask (room being left to pour in water) be higher than the bed of sand in the intermediate space betwixt the two casks. A cock is fixed in the outer cask, above the sand, at a level somewhat lower than the surface of the materials in the inner cask. The water poured in at top of the inner cask, sinks through the mass of sand ; and passing also through that in the outer cask, ascends and is discharged at the cock, when wanted. As the surface of the sand in the inner cask becomes loaded with

with impurities, remove it, and add fresh clean sand.

According to Mr. Lowitz, three half ounces of charcoal powder, and twenty-four drops of oil of vitriol suffice to purify three and an half pints of corrupted water, without giving it acidity. If the vitriol is omitted, it requires thrice the quantity of charcoal or nine half ounces. The vitriol is first mixed with the water: then the coal. Spring water having an unpleasant hepatic flavour, is improved by filtering it through a bag half full of charcoal powder. Dry this charcoal, and powder it over again; it then will answer a second time: and if made red hot in a close vessel, the coal will immediately recover its power of purifying, after having before lost it by use. Mr. Hufeland says, reduce burnt charcoal to a fine powder: mix a spoonful of it in a pint of stagnant, bad, or putrid water: stir it well and let it stand a few minutes: then run it slowly through filtering paper. The same powder will answer again. To travellers it is recommended that they dry the powder and keep it corked close up in a vial; and for families in bottles.

The third method of procuring pure and cool water is this: Make a case for containing a number of tubes placed vertically along side of each other, with proper communications from one to another.

The

The case will be compact, and may stand on a chimney-hearth or in a passage. The water is filtered through clean sand contained in the tubes. Eight tubes, one foot high, would filter through seven feet of sand in extent. The tubes may be four inches square. In the middle of the eight tubes, in the box, is a space for ice. This box would not exceed 18 inches square area, and 14 inches deep : and a box less than two feet area, would also allow room for bottles of liquor to be kept cool with the water and ice. The tubes may be of wood, or (sweeter) tin ; and if 18 inches deep, would contain a third more of sand and water : that is, above nine feet in extent. The first tube receives a head of water above the range of the other tubes, which is to be occasionally renewed with water.

Rain water is saved in cisterns under ground in many places of Europe, especially in Holland, Spain, Italy and Sicily ; and according to travellers, there is no sweeter or purer water. It is esteemed according to its age, which gives it its remarkable purity. I think it is Mr. Stolberg who says rain water three years old was recommended to him, and he found it very excellent. In Malta every inhabitant is obliged to have a cistern for water in his house ; and there are *waterhouses* cut in the rocks, which contain water sufficient for three years ; and it is kept very good, and used at all times. Month. Mag.

or British Register, April, 1799. See before page 417, of House Cisterns. Water saved in cisterns should be so deep under ground as to be below the warmth that will produce fermentation; therefore prefer the double cube, and prevent access of the external air to the water.

FIRST IMPRESSIONS.

Science is but little regarded by husbandmen. Yet an education which tends to promote the social virtues and manners, is invaluable in all stations of life. But *the virtues with happy manners*, can only be assured to the rising generation through the very earliest attentions to children by the pious good *mother* and *nurse*; beginning with the first lisp: for children reason and understand, though not strongly, yet long before they can articulate.

Nevertheless, how neglected and how little understood is education, as well in the town as the country. Parents act as if all that is necessary is to send children to school: but how misplaced is book learning without first impressing them at home with good intentions, good principles; and leading them to a desire of improving as well their *manners* as their *minds*.*

Attentions

* Certain Indians were asked why they took their boys so soon from school amongst the white people? They answered,— “Because Indians who get *school learning*, prove to be the

Attentions are misapplied in the education of children which early burthen their memories with religious productions of inventive men. Religion, morals and manners are contained in the Gospel of Jesus Christ; which consists of a few plain principles that are invaluable! but these are nearly lost in a cloud of forced and unnatural exposition and fantasy. To impress the minds of children with the general belief of their subordination to a *Supreme Being* who is *perfect goodness*, without attempting thus early to explain more of the Deity, is it not for children, enough of religious concerns?

“ Amongst the ancient Romans, parents anxiously attended to the education of their children; beginning it from their birth. They committed them to the care of some well known *prudent matron* of character (or the mother performed it) whose business it was to form their *first habits* of acting and speaking; to *watch* their growing passions, and *direct* them to the proper objects; to *superintend* their sports, and suffer nothing *indecent* or impro-

H h 2

“ per

greatest rogues in our nation.” The boys had never been prepared or impressed with *good principles* in their tender infancy. So of certain classes of white people.—They obtain school education, and turn out brimful of the dogmas of men, without having been ever led to attend to and admire the morality of the Gospel, or any thing like moral and virtuous conduct, or amiable manners.

" per to come from them : that the mind preserved
" in its *innocence*, nor depraved by a taste of delusive
" pleasure, might be *free* to pursue things laudable,
" and apply its whole strength to the profession in
" which it is disposed to excel. No time of im-
" provement was lost ; *and literary instruction kept*
" *pace with the moral.* They were accustomed to
" hear at home the *purest language and sentiment,*
" from their *nurses, their fathers, and their mothers,*
" accompanied with attentions, gentle manners and
" address towards all their fellow creatures."

It was the principal study of the *Egyptians* in the education of their children to implant in them the virtues of *industry, economy, gratitude, and truth* : upon these they considered the general happiness of their country to depend : to this source was traced all that was excellent in their *laws, their government or their morals*, and that tended to propagate and improve the *sciences.* Frank. Eg. 354.

RAW LIME-STONE AND GYPSUM MANURES.

Mr. Chancellor *Livingston* of New-York, has made a number of valuable experiments, which are published by the agricultural society there, and from which the following are selected. In August 1790, on a rood of stiff clay ground lying very flat, he spread

one bushel of pulverised *limestone*. In the next summer, the effects of it were discernible to an inch, both in the verdure and luxuriancy of the *grass*. The difference between it and the parts adjoining were in its favour, as he judged on counting the cocks, as seven to four: from whence he infers that, on *clay* ground, eight bushels of pulverised limestone are at least equal to six of *gypsum*. This is very important testimony. Many places are scarce of fuel for burning limestone: and if ever so plenty, husbandmen can find means for pulverising eight bushels of the stone, at a cheaper and more advantageous rate than they can break up and reduce 100 bushels of stone, cut the wood, cart in the stone and wood, charge the kiln, and attend several days and nights to feed it; besides the difference of carrying it out and strewing it on the fields.* At the same time the Chancellor tried the effects of pulverised *limestone* at the rate of ten bushels to the acre on a *sandy loam*; and this acquired the same verdue as the part that had been dressed with *gypsum*.—On the 20 May 1791, the Chancellor viewed a piece of *flax*, sown very injudiciously by a poor tenant, on a *dry sandy declivity*. It looked extremely sickly, and the tenant thought of plowing it up: but the Chancellor prescribed for it, three bushels of *gypsum* to be applied the next morning whilst the dew should be yet on the ground.

It

* 1 And. Husb. 276, speaks of a mill for beating *lime-stone* into a powder for *manure*; according to M. Duhamel.

It was accordingly applied, and the benevolent Chancellor expresses his satisfaction in having seen the tenant gather more *flax* from this *half acre*, in an uncommon dry summer, than any *acre* in the neighbourhood afforded. In many cases of experience, the principle I hold of gypsum shewing its extraordinary power in promoting vegetation mostly in *dry seasons*, is corroborated: for it is principally in *dry seasons* and situations that gypsum shews its importance in pushing vegetation forward; undoubtedly by its superior virtue in inviting or attracting particles of moisture, to itself and plants near it.

Mr. Chancellor Livingston from his eighteen experiments on gypsum, raw limestone; and oyster-shells, pulverised; draws the following inferences:

1. That *gypsum* in small quantities has no visible effect, on *wheat* or *rye*.
2. That it is uniformly beneficial to *Indian corn*; unless it be in very rich or very wet soils.*
3. That it is beneficial to *flax* on dry poor sandy land.
4. That

* *Rich* or *wet* soils, want not the aid of *gypsum*; the property whereof is to attract *moisture*, where soil is *poor* or *dry*. See p. 348, 349.

4. That it is peculiarly adapted to the growth of *clover in all dry soils*, or even in wet soils in a *dry season*.

5. That *limestone pulverised*, has similar effects with *gypsum*: but whether it is better adapted to wet soils, he could not as yet determine.

6. Another fact, he says, seems to be very well established, though he could say nothing of it from his own experience, that the effects of gypsum as a manure are hardly perceptible in the vicinity of the sea.

RUST OF WHEAT.

"Mr. Isaac Young, of Georgia, mixed rye amongst his seed wheat, and thus escaped the blast of his wheat. It was repeatedly tried, till he was convinced of its efficacy: and then he sowed five acres with *wheat, surrounded with a list of 25 feet breadth of rye*: and this also succeeded; and being repeated, is found a certain security to the wheat." *Rom. Florida 118.*

I have also heard an English farmer say that rye sown mixt with wheat will prevent the wheat from being blighted, in England.

A Stuffing for Leather, in Shoes and Boots.

The New-England fishermen find great benefit from serving their boots with the following composition ; which excludes water, and preserves boots and shoes. The same advantages are applicable to the shoes of husbandmen. My shoes have been served with it constantly for seven years ; and in no instance has it let in any water or dampness through the leather : nor does it harden or stiffen the thinnest calf leather. One pint of boiled *linseed oil* ; half a pound of *mutton suet* ; six ounces clean *bees-wax* ; four ounces *rosin* : melt and mix well over a slow fire. Shoes or boots when quite new and clean, are a little warmed ; and then are served with the stuffing also warmed, but so as not to scald, as much as the outside of the leather, upper and soal, can receive ; and especially the seams and joining of the soal and upper leather are to be well stuffed ; taking care the tack-holes are plugged up ; and that all is perfectly dry. The leather will want no renewal of the stuffing : at least my shoes never have. I use a painter's brush for laying on the stuff. This stuffing fills the pores of the leather and excludes water, as the sap of green wood when inspissated by fire fills the pores of wood and excludes water.

BRAMBLE

B R A M B L E F E N C E S.

The intelligent Doctor *Anderson*, of Scotland, gives an interesting account of the *bramble*; and recommends it as far preferable to the sweet briar in a fence.

Its character is, that it resembles the raspberry in the manner of its growth; and they differ from all other plants. But the bramble has a peculiarity, differing from the raspberry in this: it alone possesses the faculty to strike out roots *at the point* of each shoot of a year's growth; and no other part of the stem can be brought to strike root, even if laid in the ground. So that to prevent brambles from rambling and fouling the ground, nothing more is necessary than to walk round the bramble fence, and whip off the ends which dangle towards the ground. He recommends every *August* for this work. It will want no other clipping, shortening, or dressing.

Like the raspberry, the bramble yearly sends out many shoots from the bottom (the ground), which push out to the whole length they ever attain, during the first year. These shoots, in this season, consist of *single stems* which never branch, unless where by accident they have been cut over, when they become forked. In the next season these *stems* set out many fruit-bearing branches, along their whole length,

length, which flower and perfect their seeds, while a new set of *stems* are pushing from the bottom to become seed-bearers next season. After perfecting their seeds the *whole stem* that bore them, with all its branches *dies*. This is the unvarying progression observed in the growth of the bramble plant : so that a hedge of it, will at all times contain *three distinct kinds of shoots*, intermixed with and crossing each other in all directions: 1. the *dead shoots*; 2. the *fruit shoots*; 3. the *roots pushing forward* in their *lengthy growth*. They are all covered with strong spines, and form an impenetrable matting, when confined within proper bounds. Mr. *Le Blanc*, in the 2d Annal, says it is worthy of the attention of all who wish to raise live hedges in a poor sandy soil, in the shortest time, and at the least expence, to cultivate the *bramble*. In a field of blowing sand, in which sheep were kept, on one side of a road the bank was planted with *brambles* mixed with white thorn, and a dead hedge placed on the top. The bramble not only defends the young quick from sheep, but also by twisting through the dead hedge, strengthens it from being broken down. On the other side of the road, the bank was at the same time planted with white thorn, only. The dead hedge to it, has been several times renewed, and there is no probability that this white thorn, will ever become a fence. What a valuable corroboration this

is

is of Doct. *Anderson's* proposed bramble fence, on light poor land ! See his 3d volume of Essays.

A good fence of *bank and bramble* may be reared in most situations, says Mr. Anderson, at 2*d.* to 3*d.* sterling a yard (3 to 5 cents;) for a facing is required only on one side.

Sweet briar he observes is not equal to the bramble : for unless it be often cut over by the roots, it gets naked below, rugged and unsightly, if without support from other plants ; and if other plants be near them, they grow poorly. In exposed situations too the wind gets hold of the tops and by acting on them as a lever, is apt to pull down the bank.

The *bramble* is liable to none of these objections ; and it seems to be, he adds, the very plant fitted by nature for forming that close, netted prickly coping, alike wanted to prevent animals from tearing down the bank, and to preserve it from the levelling power of the wind, and other external injuries. The bramble especially excels other plants on upland thin ground.

Bramble fences, which are equally applicable in soft good soils and those that are harder in rocky and hilly countries, may be thus constructed :

A *bank* is raised on the inner side of a *ditch*, where it can be dug and faced with stones, of a good binding quality ; or if the stones are small or roundish, or fewer than wanted, they may be laid in alternate rows with *sodis*. Where no stones are to be had, the facing may be entirely of sod. The backing to be made of earth, dug either from the ditch, if on a level, or scraped from without, if upon a slope ; or taken from behind where it is easiest had ; so as to raise the *wall* with its *ditch* four to five feet high. Upon the *top* of this *bank* and about *one foot* *backwards* from its *edge*, plant a row of *bramble plants*, at about six inches apart all around. If taken from the commons be sure they are all *young plants* nearly grown and well rooted : for it is of the utmost consequence that the hedge should *come forward equally* in all its parts ; so as not to leave a single gap in any place. To insure this, plants reared from seeds are best and the cheapest. The plants are to be examined the *first season after planting* ; and supplied with what are wanting : without which attention, the hedge can never afterwards be made *equal* and *uniform* throughout. I am induced, says Mr. Anderson, to take notice of the circumstance *thus pointedly* from observing a culpable carelessness respecting it, which is the chief cause of the *raggedness* in hedges that every where prevails. If a dead fence of thorns and brushwood be placed on the top of the fence at the time when the *brambles* are planted, these live plants may be intermixed

intermixed with the dead fence, to advantage rather than detriment. Care is to be taken of sheep, that they have not access to injure the *bank*.

If the hedge has been planted with care, it will come forward with great luxuriance, in shoots which rising upwards and spreading out on both sides form a close matted coping of spring plants all over, which will effectually prevent intrusion of men or animals.

The people of Kent county, Maryland, who made naked bank fences, mentioned in page 196, wanted only to know the above uses of bramble plants for them to have completed their design. They made banks, and sodded them very perfectly. Brambles upon these banks would have properly shaded the banks and preserved the grass, and with dead wood for the first season or two among the brambles would have kept off beasts from cutting down the sods, and always afterwards.

IMPROVEMENT OF THE MIND FOR RURAL LIFE.

“ Of scientifical pursuits, the most liberal, the most honorable, the happiest, and what probably will be the most successful employment for a man in easy circumstances, (particularly in country life,) is the *study of nature*, including natural history and natural philosophy ; and therefore to this important object a principal

principal attention should be given in educating youth who have the means of applying to these instructive and comfortable pursuits, when it may be without interfering with the means necessary to his support. Every man finds vacant moments from his ordinary business, which cannot be better filled than by such attentions as lead to the improvement of his understanding and elevate his mind to admire, more and more, the astonishing works of the Creator ; and thus is real religion befriended.

“ All the *arts*, from whence is derived all that tends to the security and comfort of mankind, depend upon the knowledge of the *powers of nature* wherewith we become conversant ; and the only possible way of assuring and increasing the conveniences and comforts of life, of guarding against inconveniences and vexations, to which all are subject, and of enlarging the powers of man, is through a further acquaintance with the *powers of nature* ! ”—From Doctor *Priestly*, a very little altered. Some instruction in geometry and mechanics would also be advantageous in country life.

Farmers who do not lay the hand to the plow, often want they know not what : time hangs heavy on them : They feel dissatisfied, restless : a void surrounds them. Employment of any sort would give them relief. But they mount the horse, and leave their *family* and the inviting calls of an improvable farm,

farm, to seek amusement in riding to and fro ; sometimes unwarily popping into taverns. But, though time is thus passed away, they gain no solid or permanent satisfaction, much less any improvement of the mind : and to be sure the farm is not improved ; nor its work well done. Were these masters of farms fortunately led by *their parents* to the *study of nature*, they would never want soothing and nourishing food to the mind ; and from their being employed in inquiries concerning the wonderful works of the *Supreme-Good, God alone wise*, a sound and rational piety would be increased and confirmed in them. The book of nature far surpasses books of clumsy art ; whilst the wordy works of misled and misleading instructors convey no profitable knowledge, and are insignificant to common sense, the understanding given us by God, and to good minds wishing to be impressed with the knowledge of plain truths, and improved in whatever is amiable and promotive of good. The comforts held out by the gospel of *Christ*, confirm the hope derived from contemplations on *nature* : and there is a perfect agreement between the pure intelligible principles of the *gospel*, and the laws of *nature* ; but which folly would set at variance. “ The sublime instinct of our minds, our souls, “ may be misled ; but can never be annihilated by “ the doctrines of a false philosophy or the unintelli- “ gible jargon of trained teachers ; a consciousness “ whereof impels us to admire and love wisdom and
generosity

"generosity of conduct, as we do grandeur and symmetry in nature."

"Can the sublime ideas of a divine Creator, whose providence watches over the world and the immortality of the soul, that consolatory hope of persecuted virtue, be nothing more than amiable and splendid chimeras? But in how much obscurity are these difficult problems involved! What accumulated objections arise, when we wish to examine them with mathematical rigour! No; it is not given to the human mind to behold these truths in the full day of perfect evidence: But why should the man of sensibility repine at not being able to demonstrate what he *feels to be true!*"

"In the silence of the closet and the dryness of discussion, I can agree with extravagant or absurd teachers, as to the insolubility of certain questions: but, when in the country and contemplating nature, the soul full of emotion, soars aloft to the vivifying principle that animates it, to the Almighty intellect that pervades it, and to the goodness that renders the same delightful and just to my senses derived from the Creator; enjoying the truths demonstrated to me, and giving way to feelings so impressive and satisfactory, I am content to remain ignorant of what cannot be known, and give myself no disturbance about the opinions of others.

But

" But I conform to the *public worship*, because my
" situation makes it my duty so to do." Mdm. Rol.

ORCHARDS.

It seems, in England as in America, orchards have been considerably neglected ; and the knowledge of proper modes of managing them was not generally well known in the moment when a well-timed and generous interference of a Mr. Bucknall, effected such a current in favour of them, as that they are again becoming a great consideration in England. Besides Mr. Bucknall's personal attention to his own, his neighbours, and friends orchards, and very actively diffusing a knowledge of the new principles in conversations, he addressed the London society for the encouragement of arts, laid before them his principles of *orcharding*, as he calls it, obtained first their silver medal, and on a further communication their gold medal with their thanks. The certificates accompanying his communications are very strong in their favour ; and his practice is warmly adopted, and in a course of being generally pursued by the English farmers. An experienced and intelligent farmer, from New England, also assures me that for the correctness of Mr. Bucknall's principle on close-pruning he can vouch, from his own practice twenty-five years ago. A pamphlet on Mr. Bucknall's principles and practice is publish-

ed in London, entitled *The Orchardist*; from which the following notes are taken.

The management of orchards is capable of being reduced to a system, under a few general heads concentrated in the principle of making every tree in orchards, *healthy, round, large, and beautiful.*

Due pruning would greatly prevent the *speckled and stunted fruits* occasioned by the trees being *over-loaded with wood*; which obstructs the rays of the sun, and causes a *vapour*, the cold whereof *stunts the fruit* in its first growth.

The bark of trees consists of the *outer*, rough; the *middle*, soft and spongy; the *inner*, a whitish rind which joins the bark to the wood, and is supposed to contain the liquid sap.

When the stem grows too fast for the bark, it causes blotches and lacerations; which is avoided by *scoring the bark* with a sharp knife, so as *not to cut through* the whitish rind or inner bark.

CLOSE-PRUNING, AND MEDICATING FRUIT-TREES.

Pruning with judgment brings trees to bear sooner; and continue in vigour nearly double their common

common age. Mr. Bucknall gives no attention to fruit branches and wood branches in the present instance.* No branch is ever to be shortened; unless for the figure of the tree, and then close at the separation.

The more the range of the branches shoot *circumlarly*, a little *inclining upward*, the more equally the sap will be distributed, and the better will the tree bear.

Let not the ranges of branches be too *near each other*; as all the fruit and leaves should have their full share of the *sun*. Where it suits, let the *middle* of the tree be free from wood; so that no branch crosses another, but all the extreme *ends point outwards*.

A neighbour saying, your trees are *handsome* but too *thin of wood*, is a high compliment; for such trees will gain the best price for the fruit at market, a sure test of perfection.

A young orchard was planted in a rich soil and it thrrove greatly. Such vigorous growth occasioned

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* The expression "*In the present instance*" must mean, in general, respecting his present subject of pruning: gives no attention to fruit branches and wood branches, in pruning fruit trees suffered to run greatly into wood: but thins them to be *airy*, and to give *shape* and *regular branches*.

an early decay of the trees, from the wind splitting them down ; and the wood being soft many causes concurred to injure them. The injudicious manner in which the lacerations were taken off added to the evil ; for generally a gum follows from a wound, and this becomes filled with vermin, which obstruct the healing by their eating and fretting the bark. Mr. Bucknall is here speaking of an orchard of both *apple* and *cherry* trees ; the latter yield gum.

He found the branches so intermixed and entangled together as to cut each other and cause wounds and blotches ; which on the return of the sap in the spring, affects the leaves by inclining them to curl.

In this state of the orchard, in the November following, Mr. Bucknall undertook to improve it ; and found that the branches could not be cut true enough with *a bill*, to take them off, without leaving a stump or improper wound, as it is essential that every branch should be cut perfectly *close and smooth*. He therefore used *saws*, and afterwards *smoothed with a knife*. Immediately on this the wounds, with *medicated tar* on a brush, were *smear-ed over*.

As the *bark can never grow over a stump*, he always cuts a little *within* the wood. The rule is to cut *quick, close, and smooth*.

Mr.

Mr. Bucknall and his assistants kept together, and first walked round the tree. He then pointed out *every branch* that came *near the ground* or had *received material injury*, or where the *leaves* were *much curled* (which are accompanied with specky fruit;) and every branch having the *least tendency to cross the tree or run inwards*, all whereof were taken off. Then he attended to the beauty of the *head*, leaving all the branches as nearly equidistant as possible. Next they examined if there were any remaining *blotches*; and opened and scored them with the knife; and where the bark was *ragged* from laceration, pared it gently down till they came to the live wood. Each of these were then touched over with the medicated tar. The *moss* should then be rubbed off and the trees *scored*.

In cutting they went *to the quick*, but avoided making the wound larger than necessary.

In doubting whether a particular branch should be taken off, they considered if it will be in the way three years hence. If it will, the sooner it is off the better.

When trees are much trimmed they throw out many shoots in the spring. It is necessary that these be *rubbed off*, not cut; for cutting increases them.

The

The *MEDICATED TAR* is composed of one half ounce of *corrosive sublimate*, reduced to a fine powder by beating it with a *wooden* hammer: then put it into a three-pint *earthen* pipkin, with a glass full of gin or other spirit stirred well together, and the sublimate thus dissolved. The pipkin is then filled by degrees with common *tar*, and constantly stirred, till the mixture is blended, intimately as possible. This quantity is sufficient for 200 trees.

Corrosive sublimate is a violent poison; and to prevent mischief, it is to be instantly mixed in the *tar*, *soon as brought*. Mr. Bucknall finds the sublimate dissolves better when united with the same quantity of spirit of hartshorn or of sal ammoniac.*

Farmers fearing to meddle with corrosive sublimate may get their apothecary to mix the ingredients; the *tar* being sent to him. Or let them try the following as an experiment. Mix fish oil one part with tar two or three parts, by stirring them well over a gentle fire, that the mixture may be perfect. Apply it when cold. Would you add things bitter or acrid; as aloes, or red pepper?

For giving more body or consistence to this mixture, add fine powder of fullers earth or clay; or according to Lord Newark, powdered chalk.

Do

* October, would give more time for the wounds to heal, before winter sets in.

Do not attempt to force a tree to grow higher than it is disposed to grow: but keep the branches out of the reach of cattle: then let them follow their natural growth.

In general prune trees *soon as the fruit is off*, that the wounds may tend towards healing before the frost comes on.

The substantial form of the tree is the same before and after pruning. It is of the same size, and the extreme shoots are all kept at the same distance. But too often the heads of trees are mutilated and the tree is left in a more decaying state.

The year before the trees are to be planted out, choose and *prune them in the nursery*; taking off perfectly close, all rambling and unsightly branches, leaving the *heads* to three or four good leading shoots. From pruning thus in the *nursery* the year preceding the planting out the trees, it will not be requisite to prune for some time; and the wounds being healed, will accelerate their growth. Plant none galled, fretted or cankered. Take them up to be planted, with roots long as is convenient. Prepare stakes *before* the day of planting, and stake them immediately.

Shelter, by trees, is requisite on the cold blowing sides of the orchard, north-west to north-east.

Plant

Plant not the trees too *deep*; many ills arise from it.

Mr. Bucknall's tools are; two pruning knives; a saw; two chisels; a mallet; a spoke shave, and a painter's brush. With the chisels and spoke shave work upwards, or the bark will shiver. The saw must be coarse set; all the other tools sharp and smooth,

He prefers the blade-bone of a doe, for rubbing off rotten bark, moss, &c.

When the trees are planted, a question arises what use is to be made of the ground? To plow it is dangerous; as the injuries received by young trees from implements in husbandry are great; and if any kind of *corn* is grown, the land is impoverished, and then the trees are stunted and run to moss. *Hops* do well for some years, and then let the ground be *grazed*: and the ground is never to be plowed deep directly *over the roots* of a young planted fruit tree.

Manure is necessary to an orchard; and hog's dung is the best. *Watering* orchards in dry weather is important—which may be best accomplished if a stream can be led through it,

Prevent

Prevent young trees bearing much fruit: pluck it off soon as seen, except half a dozen to show the quality. *Graze and manure.* Hogs are best to run in orchards.

Although no leading branches are to be *shortened*, yet whilst *in the nursery*, the *heads* must be *cut down* to give strength and *symmetry* to the stem; and also most of the *grafts* must be shortened, or the wind will blow them out; and whilst *in the infant state*, shortening the plant helps to swell out the buds. *Shortening* is only forbid when the plant becomes a tree.

Moss is the result of *poverty* and *neglect*, and reflects discredit on the owner. In a wet day, a strong man with a birch-broom can do great good on moss. He is to rub all the branches, spring and autumn, with a hand-brush and soap-suds. They may then be oiled or not, as you like.

The best orchard soil is a *deep loam*. No one for profit would plant on a strong clay or a cold sharp gravel. But where it is necessary to plant on these soils, never dig into the under-strata; which would be planting in well-holes: rather plant the trees above ground, raising over them a little mound of good mould, and sow on it white clover.

In pruning, never omit the *medication*; as the mercury is found strongly operative in removing the effects of canker, giving a smoothness of the bark, and a freeness of growth.

The system of *close-pruning and medication* here follows, that it may be seen at once:—Take off every *stump*, the *decayed or blighted branches*, with all that *crosses* the tree, or where the *leaves curl, close, smooth, and even*. Pare the gum down close to the bark, and even a little within, but not to destroy the rough coat: open the fissures from whence the gum oozes, to the bottom: cut away the blotches and pare down the canker: then anoint all the wounds with the medication, smearing a little over the canker not large enough to be cut: wash and score the tree, rubbing off the moss; but do not shorten a single branch.

A tree under such care must, with its remaining free shoots, run large; which requiring a great flow of sap will keep the roots in constant employ, and from that very source necessarily establish permanent health.

Canker, he says, arises much from animalculæ; and if the only object is to remove the *canker*, he finds hogs-lard preferable to tar; but where *wet* is to

to be guarded against, tar is superlatively better. Therefore *tar and oil*, as above.

Mr. Morfhead practised *close-pruning and medication*, according to Mr. Bucknall, on a great variety of fruit trees of all ages; which succeeded beyond his expectations.

Mr. Twamley's principles on pruning orchards accord with Mr. Bucknall's, as far as he touches on it.

P E A C H T R E E S.

A farmer in New-Jersey has published in the news-papers, an account of peach trees; in which he says, on the second of June 1795 his peach trees were in a very sickly state: that he applied the remedy below mentioned; in consequence whereof by the middle of July they had recovered their full verdure and health; and that in 1799 they still continued in full health.

His remedy was in laying *bare the stems* of the trees and *the roots near to the stems*, by taking the earth away. There then appeared in the trees a number of holes the size of gimblet holes. On probing them hairy worms were brought out, of a whitish colour, except that the head was brown with

with a sharp nose ; and it was an inch long and had a boring motion. Burdock leaves were dipped in whale oil (currier's fish oil) and wrapped about the part of the trees affected ; and then the earth taken off was thrown on them. Six quarts of oil served twenty trees. Three of his trees had bees under them, in hives. Fearing to disturb the bees with the smell of the oil, the stems and roots only were laid bare as above ; and these trees also recovered.

He thinks the effluvium of the oil soon killed the worms in the first instance ; and that from their being very porous, the air entering the pores killed them in the last instance : and he adds as his opinion that if the trees are *laid bare* as above *in the spring* and *covered before winter* sets in, it may answer the desired effect, with taking off the fungus or gum on the body of the tree under which the worms breed. A number of them were taken from within a lump of gum, and they all “ dissolved” in the *air*. The old worm on having a drop of *oil* put on its head, drew up in a ball and instantly died.

He says, a large peach orchard, in Jersey, was on a loose sand, called the sand hills ; which he thinks was “ an old orchard in 1738,” when he knew it, and he thinks it was in being in 1776 when he rode over those hills, so that it continued

more

more than 40 years. He thereon infers that sandy soil is best for peach trees.

I have known peach trees give fruit many years in the *sandy* lands of Severn River, in the country about Annapolis; and also on *clay loams* in the peninsula of Chesapeake; where they were in old fields, or free from spade or plow breaking the ground near them. An apricot tree stood a number of years in a garden where the ground was *yearly dug* about it; the fruit always dropt off before it could ripen. That part of the garden being turned out, the ground settled and remained *close* and *hard* all about the tree: from which time it matured its fruit.

The winter 1783-4 was extremely severe. Its frost killed many noble oaks and other trees, but not one of many peach trees in my orchard and garden. The garden peach trees annually suffered by the worm above described, but not those in the orchard where the *ground* remained *unstirred*. In the spring 1784 many seedling peach trees being hove up by the frost, seemed to stand on their main roots partly above ground, without being injured. These proofs of the hardiness of peach trees induced me to dig the earth from the garden peach trees late in November and return it in April. In several

years

years of this being practised, I recollect no instance of the worm in those trees.

DIET FOR PRISONERS:

—Issued to the prisoners in the gaol of Philadelphia in 1798; for 230 men and women.

BREAKFAST AND SUPPER:

Indian-meal 29½ gals.	5 lb. a gal.	147 lb. at 2 c. 1 $\frac{4}{5}$ m. a lb.	C. M.
Melasses 4½ gals.	at 60 c.	. . . . .	314 6
Salt 3 qts.	. . . . .	. . . . .	270 0
Water 96 gals. in <i>Mush</i> 384 qts. of which	c. m.	. . . . .	6 6
			—
			591 2
For breakfast, at 1 3 (more exact 1.285)	C. M.		
each person,		295 5	
For supper, do.		295 5	
		—	
		591	

DINN E R.

Beef 50 lb. at 6.6	. . . . .	330 0
Shins 4	. . . . .	53 3
Potatoes 1 $\frac{1}{2}$ bush.	. . . . .	75 0
Meal, for thickening, 12 qts.	. . . . .	43 3
Onions, herbs, pepper, salt	. . . . .	20 0
Water 56 gals.— <i>Soup</i> 224 qts.	. . . . .	— 521 6
		—	1112 8
			Dinner

	<i>c. m.</i>
Dinner, 224 q's. soup, cost 521 6 or each 2 2 (more exactly 2 c. $\frac{2}{5}$).	
Breakfast, each person	1 3
Supper, do.	1 3
	<hr/>
Three meals.	4 8 a day.

Their diet is varied.

The sums of the account kept are in *L. S. D.* here reduced to Cents and Mills ; 10 Mills a Cent ; 100 Cents a Dollar.

THRASHING MILLS.

In 1782 Colonel *Anderson* then of Philadelphia, now residing on the Susquehanna, near Lancaster, invented a mill moved by horses, for thrashing wheat and other small grain out from its straw : and took the hint from seeing a cotton machine at work in Philadelphia. In 1791 he built one of full size ; which (on a trial of it) I saw work to advantage, though as Colonel Anderson well observed, it was capable of considerable improvement. But having since invented a thrashing mill, on different principles, a model of which I saw work admirably well, he probably has not further attended to the first ; and I wait to hear of his ordinary business admitting him to build one of full size, on his new invention of *rubbing*, instead of *striking* out the grain. If this kind of mill shall be equal to the former when both are worked

worked with horses, it will have the further advantage of admitting to be reduced in size and then worked by one or two men at a winch or two suitable to small farms : so that husbandmen on farms of all sizes might use them in place of flail and treading. *Rubbing*, in idea, is inferior to *striking* ; yet the above model performed surprisingly well, in rubbing out wheat.

About the time that Colonel Anderson invented his mill, a thrashing mill, on the very same principles, was invented in Scotland.*

Colonel *Dundas*, in the 15 Annal gives an account of a thrashing mill built for him by Mr. *Rastick* in Scotland. It had then been worked for the greatest part of two crops ; and the Colonel says the mill is in a barn ; an octagon shed built on the outside was only necessary to be added for covering the wheel and horse-path ; and that,

The

* In England and Scotland it is found very advantageous to *reap* their wheat *early*, that is meant to be beat out by the mill ; so early as that the straw shall cure tough, and not break short and brittle under the operation of the mill : by which means the wheat is much more perfectly saved, according to the information of an intelligent English farmer now in America.

The mill cost sterling 45£.		
equal to	Dollars	200
A cover of boards, with wire platform under the beaters	£3. 3.	67
The shed, to cover the wheel and horses	12. 0.	
		—
		267

The wire platform begins under the canvas, or floping board, and extends as far as any grain falls, and has openings to allow the grain to pass. A woman and boy with a rake can clear the machine of straw, whilst the grain falls through the wire in a state for being fanned.

It thrashes 180 *bushels of wheat* in ten hours, very clean. *Barley* is thrashed with flails, after it comes from the mill for breaking off the awns or beards.

One horse will work the machine : rather hard work. He uses two horses. If a diligent person drives the horses, all persons about the mill must be busy.

The hands necessary are the *driver*, a boy ; the *feeder*, a careful attentive person ; a *person to rake*, and *two to bundle* the straw. He considers it work for three men and two boys.

Mr. *Mowbray*, of Durham, says his thrashing mill, built by Mr. *Rastrick*, has given him great satisfaction. He uses two horses, a boy, a man, and two women. It had thrashed out 12800 bushels of wheat; 6400 bushels of oats, and 6400 bushels of barley: in all 25600 bushels of grain; and had cost him nothing in repairs; and there is no difficulty in working it.

Mr. *Wilkie* says his thrashing mill is so simple that repairs can be seldom wanting. It is a most valuable machine.

Mr. *Bsys's* mill is in a barn, and a projecting building contains the great wheel: which is 12 feet diameter, has 120 cogs working into 12: the cogs at the end of the shaft are 87, which work into 14. The under, of the two cylinders, for drawing the corn through, is of wood, the upper of cast iron: a wheel of 15 cogs works into 33 for turning them. The beating or flail wheel (or barrel), is 5 feet long, and $3\frac{1}{2}$ feet diameter to outside beaters: has 4 of these beaters, or battens fixed to it, and strikes upwards; 1000 strokes in a minute. Others strike downwards, which do not clear away the straw equally well. The straw is carried over the beating wheel, and falls on a latticed floor, for the short stuff to fall through. Four horses work the mill. A boy drives:

drives : *a man* throws up the sheaves : *a boy* supplies : *one man* to spread them on the inclined plane ; and *two men* to fork away the straw. *The whole 4 men, 2 boys, 4 horses.** It thrashed 360 bushels of oats in 10 hours. For clearing away the straw, as it comes from the mill, a wheel turns in a direction contrary to the beating wheel, and clears it completely. 15 An. 481. 20 An. 248. 504.—Mr. Meikle† built a mill for Mr. Adams, worked with *four horses*, which thrashes out 640 bushels oats in 10 hours. Length of the barrel $4\frac{1}{2}$ feet, diameter $3\frac{1}{2}$ feet, *treble motion*. Wheels, cast iron. There are many mills for threshing, of different construction in England and Scotland : all on the principle of *battens upon a barrel*, for beating out the grain.

K k 2

LABOUR-

* *Horses* are more expensive than *oxen* for all such work : and they are less steady than *oxen*. Whilst *oxen* are performing the work, they increase in value full ten dollars a year. This with their *dung* pays for their keeping : so that their labour is clear gain.

+ Mr. And. Meikle erected his first threshing mill in 1788 ; since when he has progressively improved them. The *labour is simplified*, and the *performance augmented*. By adding rakes or shakers, and two pair of fanners, all driven by the same machinery, threshing, shaking, and winnowing, are now performed all at once, and the grain is made clean for market.

LABOURING POOR, IN ENGLAND.

Mr. Marshall states the expences of a *labouring or poor family* in England thus:

		Shil.	Cents.
For Wheat and rye	.	120	or 2666
Fuel	.	13	. 288
Candles and soap	.	8	. 177
Furniture	.	10	. 222
Tools	.	5	. 111
Rent	.	26	. 577
Man's coat, &c.	.	22	. 488
Hose and hat	.	3	. 66
Shirts	.	10	. 222
Shoes	.	8	. 177
Wife and children's clothes		86	. 1911
Meat, &c.	.	137	. 3044
		448	. 99.50

So that, in England, a labourer having a wife and two children, and expending 100 dollars, has 4 dollars over and above the means of supporting them through the year in a comfortable habitation, with the other necessary comforts of life. They scarcely spend a shilling on physick. Keeping out of tippling houses, which is easily and cheerfully observed by a good husband and father, the four dollars is a treasure of evidence to a round of perennial content and happiness; in succession through father and son from generation to generation.

LABOUR-

LABOURING POOR IN IRELAND.—Expences.

		Shil.	Cents.
Cabbin and garden	.	30	or 666
Labour in the garden	.	30	.
Two cows	.	50	.
Hay for them	.	30	.
Turf (fuel)	.	14	.
Clothing 15s. a head, for 5	.	75	.
Tools	.	5	.
Hearth tax	.	2	.
		<hr/>	<hr/>
		236s. or	52.44

Their Receipts.

The year . . . 365 days.

deduct, Sundays . 52

Bad weather 30

Holy-days 10

 92

 d. s. d. cents.
 273 at 6, 136:6 or 3035

s.

Two calves . 30

Pig . . 20

Poultry . . 5

303 days spinning by } at 3d. ^{d.}
 wife and daughter } 75:3

 130:3 2900

 266:9 = 5935

Expenses

	s.	d.	cents.
Expenses	236 : 0	=	5244
Remain for whisky, &c. &c.	30 : 9		686
			<hr/>
	266 : 9	=	59.30

These cotters Mr. Young says, are very much addicted to pilfering.—He adds, their general character is *idleness*, with want of *attention*.—Such habits must arise from their having *more arable land* than is manageable by a cottager or mere labouring man, or than is consistent with his office and calling; and they become neither good or happy labourers, nor contented, orderly, industrious land-holders; and then they are apt to degenerate into low beings of no character or worth in themselves or to others—and from total *idleness*, the common parent of vice, become shifty plunderers of the fruits of the labour and cares of others. In fact, Mr. Young assures us that in Ireland the cottager has allowed him one and an half acres of garden with the grass of one or two cows, and moreover the daily pay of six pence the year through. It is there thought difficult to raise a race of *little farmers* from the cottagers, by *adding land* gradually to them at a fair rent; and indeed it seems it would be unfriendly to the poor, to attempt to elevate them from happy contented cottagers to become but inferior, imperfect, and discontented mean farmers.

Whilst

Whilst the *Irish* cottager has more acres than one, the *English* cottager scarcely has a fourth part of one acre.* Of the same ground being too much for a *cottager* and too little for a *farmer*, see before in this work, of Labourers, Cottages, and Cottagers. An acre and an half, with the grafts ground of one or two cows, equal to 2 to 4 acres, are in all on a medium $4\frac{1}{2}$ acres, or 18 to 1 of the English cottager's portion.

HOG-CISTERNS

Made of brick and terrace are objected to, as being too costly, though among the first conveniences of a farm house;—to wooden ones, the objection is because incommodious;—and leaden, because poisonous and dangerous. But the cisterns preferred are built of *bricks layed in clay*, and surrounded with a *coat of clay*. Sink the pit where it is convenient to the dairy-kitchen and hog-yard, jointly.—Above ground raise a nine inch wall one foot high; raising a ridge roof over it; and placing a door in one of the gable ends.—*Marshall*.

PRESERVATION OF SEINS, TWINE, AND SMALL ROPE.

Mix 5 parts *tar*, and one of *fish-oil*, melting them together, for thoroughly incorporating them; and while

* From whence follows, *content* in the English cottager—*discontent*, and wretchedness in the *Irish* cottager.

while quite hot (but not to burn) the nets being in a tub, pour the hot mixture upon them in quantity sufficient to wet them entirely. The mixture is then drawn off by a hole at the bottom of the tub, *immediately*, in order that too much of it may not stick, and make the nets clammy, which would happen if cooled upon them: and to prevent the net stopping the hole at the bottom, a basket like cover should be applied over the hole, not in it. Thus, *spreading nets to dry is rendered unnecessary*, is a great saving of labour; and the practice has become very general in the fishery on the coast of Ireland.

CEMENT FLOORS.

They have lately become commonly applied to cottages. The materials are lime and sand, mixed in nearly the same proportion and prepared in the same manner as the common morter of bricklayers; but is made stronger and softer than for laying bricks. The bed made fair and level, the materials are carried on *in pails*, in a state between *paste and batter* and laid 4 or 5 inches thick; also an inch higher than the intended floor, to allow for settling in drying. The whole being well worked over with a spade, the surface is smoothed with a trowel; and *as it dries is repeatedly beaten* with a flat beater—better switches to prevent cracking, the workman standing on planks. In two or three weeks it may be

be walked on. On the last beating, if cross lines be deeply graven on the surface, the floor has the appearance, as well as usefulness of a freestone floor.

TURNIP-SLICER.

For feeding turnips away with safety against their choking cattle, and rendering them easily eaten by young stock, many contrivances have been applied to cut, chop, or slice them; of which Cuthbert Clarke's seems the most simple and efficacious:— Two men fitting with Clarke's machine between them, and facing each other, cut into slices three quarters of an inch thick, three tons of turnips per hour, by pushing a frame to and fro having a double edged spoke shave knife which cuts going and returning. The machine has an oaken frame, a hopper or trunk containing the turnips to be cut; the turnips resting on a board in the sliding frame, whilst this is moved backward and forward with the knife which cuts the turnips, and the slices fall through into a basket. The sliding frame has a strap at the cross piece of each end for checking the frame at each end alternately. The knife can be set to cut the slices half an inch thick.

The machine is $4\frac{1}{2}$ feet high; $2\frac{1}{2}$ feet long; 2 feet wide, outside measure, the boards are of deal

$\frac{3}{4}$ of an inch thick. Its four posts are oak, 4 inches square. The feet, sliding frame, cross bars, &c. are also of oak. The hopper is angular *within*, suited to the angle the knife, when placed in the frame, makes with the sides thereof, about 45 degrees. The frame slides to and fro upon two rollers, which abates the friction. The feet of the four posts are mortised into two pieces of plank or timber, which extend 8 or 10 inches beyond the posts to secure it from tottering or falling.

The sliding frame carrying the knife, has a board bottom larger than the lower aperture of the hopper, which has no other bottom than the board fixed in the sliding frame. This board may be about 16 inches wide between the side pieces of the sliding frame, and $2\frac{1}{2}$ feet long between two cross pieces, one at each end of the board bottom, and let into the frame. This board, or floor of the sliding frame, is divided into two, each division having an oblique or diagonal parallel side to the other, and they leave a space between them for the sliced turnips to fall through into the basket placed under the frame. Over this passage or space the broad knife is placed, each end of it turned up at right angles and let through a small mortise of the frame, where it is set to cut the turnips $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. The position of the knife and the aperture in the board are exactly alike ranged in their obliquity, of 45 degrees:

degrees: and so are the two little mortises in the frame. There is a contrivance for clearing the space of turnip slices by thrusting them out as the frame is moved. Mr. Young has given a drawing of it in his second Northern Tour, by which it is best explained.

PLANTATIONS OF TREES.

Timber becomes scarce; to an alarming degree in the old settled country of the United States. It is therefore recommended to the consideration of gentlemen *improving farmers*, few as they are, that they begin to grow plantations of wood the most generally useful; of which no tree affords any comparable to the wood of the *larch* (*pinus larix*, Lin.), according to the historical testimony of it now largely displayed in the writings, and confirmed by the recent and present practices of many in North and South Britain.

This wood, so little known to the modern world in general, was every thing to the ancients; so much so that its unlimited use has caused a scarcity, and almost a total reduction of it every where but in mountainous inland districts; from whence it cannot be conveyed for use. The Greeks, the Romans, and the old world in general, preferred it for all useful and great purposes: and now the

Russians,

Russians, a new people, bringing it with great labour from *Siberia* to *Archangel*, build their ships of war with *Larch-wood*.

Some of the modern notices of the *larch* are here mentioned, with the desire that Doctor *Anderson's* third volume of *Essays on Agriculture* be consulted on the subject, wherein he treats of the very extensive usefulness and value of the timber, with the proper attentions for propagating the *larch* in Britain, especially the practices of *North Britain*—their methods, success and profits experienced at this time.

Mr. Young in his *Eastern Tour*, gives some particulars of the cultivation and success in England; but Doctor *Anderson's* *Essays* are full of the qualities of the wood of the *larch*, and methods of raising it, with the great profit arising from plantations of it—even when very young.

It is the quickest growing tree. In England a Mr. Fellows had a plantation of *Scotch firs*, of 38 years growth: on the same land he had *larch trees* of only 31 years growth, as large as the *firs*.

An old gravel pit was planted with *spruce fir* and *larch*, in alternate rows. The *larch* trees are 6 to 12 feet high, when the *spruce* are but 2 feet on a medium;

A large

A large plantation of many acres, a poor gravelly land, containing *Scotch* and *spruce firs* and *larches*, at 16 years growth in squares of 10 feet, are worth
— the *Scotch firs* . . . 2s. 6d. each,
the *spruce firs* . . . 3 : 6
the *larch* 4 : 6.

At 10 feet there are 435 trees an acre. The *Scotch* at 2s. 6d. come to £.54 7 6 sterling, or per acre per annum £.3 7 0.—The *spruce* at 3s. 6d. to £.76 2 6 or per acre per annum to £.4 15 0.—The *larch* at 4s. 6d. to £.97 17 6 or per annum £.6 2 0 sterling; exclusive of thinnings. In what other way can £.6 sterling be made of an acre, without risque, and almost without expense?—A case is then put,

Suppose 5 acres of *larch* planted every year; at the end of 16 or 17 years, five acres will be yearly cut down, value £.500 sterling: from which day, a regular produce of £.500 a year is gained out of 100 acres of land. If let to a tenant, these 100 acres produce £.40 a year; but if planted they yield £.500 a year—what an amazing difference!

Again, suppose a single acre planted yearly: after 18 or 20 years to cut, yearly, £.100 sterling a year from only 20 acres, which if let, would be but £.8 a year. How beneficial a conduct.

But

But *larch* would sell for more than the firs, by the foot; being in every respect more valuable—and of the many excellent qualities of *larch*, see much in Doctor Anderson's third volume of *Essays on Agriculture*; especially attend to his detail of the method of propagating it, as practised in Scotland, where millions of trees are now raised from seeds in nurseries and dispersed about the country at a low price.

Moreover the *larch* is very ornamental, grows freely in all soils and situations—in building it is preferred for strength and durability; it grows straight and is excellent for piles, lasting many hundred years put to that use; as in *Venice*.—In shingles it is durable and very excellent as it is in log-houses built by the Russians, as recommended by Admiral Gregg on a visit to his friends in Scotland. Sawed into scantling it is at first white, and on 2 or 3 years exposure turns of a dark colour, is close grained with the grain filled up close and is firm and smooth. Staves of it are preferred for making casks. It saws into broad and long planks and boards. The timber is very durable in the ground—takes a fine polish—nor shrinks nor warps. The trees are generally planted in Britain and Switzerland. It is readily trained in a crooked growth for ship timber.

In *Scotland* there are *larches* 53 years old, which are 120 feet high, $3\frac{1}{2}$ feet diameter, and contain

110 solid feet of wood in the trunks. Even young larch is very durable, though of the quickest growth.—The medium growth of a plantation of larches, in 8 years, was above 20 feet in height, and they were 6 to 9 inches when planted. The same plants when 12 years old have increased in height 34 to 36 feet.

The *seeds* and the *plants* are to be had from *Scotland* in any quantities.—It is best to get seeds and plants from thence, as they cultivate the *pinus larix*, *Lin.* the true *Italian larix* of the ancients, the qualities whereof are so well known, whereas the *American larch*, seemingly different, has scarcely at all been experienced.

Whilst the plants and seeds are expected from Scotland, choose an acre to 5 acres, that may be yearly increased to other one or 5 acres, to be applied as above.—Clean and cultivate these acres perfectly, in a fallow manured; or rather *in cleaning and shaded fallow-crops*, for destroying all means of weeds growing and fouling the ground—then sow and propagate the *larch* for universal purposes, fuel alone excepted.

In a word, Mr. Anderson assures us that the *larch* is now universally preferred for plantations—that its good qualities are indeed so numerous and so

so excellent, that they need only be known to occasion its being propagated beyond any other tree whatever, in our climate. "I dare hardly even to mention these qualities, lest I be accused of exaggeration, though the proofs (continues Mr. Anderson) that ascertain them are irresistibly strong."—Wherever introduced it *grows so freely*,—is so *healthy* and *beautiful* in leaf; so *ornamental* when covered with blossoms, so *elegant* in form, that it instantly becomes a favourite with those who plant it. Then its value is immense, for *useful purposes*—compared with oak, it is twice as speedy as *oak* in growth, and where a fence was partly of oak, partly of larch, the oak rails had yielded to time, when the larch continued sound many years after.

O K R A.

In a communication from Elias Boudinot, Esq. I receive the following particulars of the okra plant.

Mr. Boudinot had been informed by a gentleman of the West Indies, that the planters of taste, there, use a drink made in imitation of the coffeeberry drink, calling it also coffee or okra coffee, made of okra seeds, and prefer it to the coffeeberry drink; which excited his attention to okra, and he cultivated it to a considerable extent in the way of experiment. It surpassed his expectation made as the coffeeberry

coffeeberry is made into a drink called *okra coffee*; and it was very generally preferred by strangers to the coffeeberry coffee.

According to Mr. Boudinot okra seeds are to be drilled in rows 36 inches apart, and 18 inches in the rows; thinning the plants when four inches high to one or two plants. Prefer a rich mellow loam, plowed deep early in the spring, and again early in May—then harrow, plant, hoe and cultivate as maize is treated.

The green pods are soon fit for culinary purposes, chiefly in soups; for which when they begin to harden, they become unfit.

About the middle of October cut down the plants, and when dry, thrash the seeds out, taking care that the pods be not exposed to rain after being cut down and before thrashed. The seeds weigh 56lb. a bushel; which at 30 bushels an acre that Mr. Boudinot thinks may be produced, would amount to near 1700lb. but say 1500lb. of okra coffee, at 12 cents per lb. it would give 18000 cents or 180 dollars per acre. The plant also is used in soups as well as the green pods, and is very wholesome and palatable.

Doctor Wright, speaking of the West India *okra*, (*Hibiscus esculentus*) says, the pods are gathered

green, cut into pieces, dried, and boiled in broths and soups. It is the chief ingredient in the pepper-pot of the West Indies, much celebrated as a rich olla.

SYRUP FROM WATER-MELONS.

It is said, a great portion of the syrup used as a sweetener in Russia is produced from the pulpy sweet part of water-melons. I am now favoured with a small quantity of the syrup of water-melon; half a pint of which was obtained in *Philadelphia*, by gradually boiling the strained pulp and juice of a melon that weighed 14lb.

Melons growing at $5\frac{1}{2}$ by $5\frac{1}{2}$ feet apart, are 1433 plants on an acre: these bearing two melons of 14lb. each, yield 4000clb. of melons, 1433 pints of syrup; which at 10 cents would come to 143 dollars, for an acre's produce.

It is also said that the peasants in the southern parts of Russia, use little other sugar than that which is obtained from water-melons. The sample given to me is a very neat well flavored syrup, of the consistence of molasses, but of a lighter colour, nearer to that of honey.

Here are flattering circumstances to induce experiments that may prove how easily the country family may become independent of foreign countries for sweets of the class of sugars, and at a very cheap rate. The syrup it is supposed may be granulated into *sugar*, or with much ease made into a *sugar candy*.

The husbandman's chief crop for giving him income in money is *wheat*; for which he labours, in several plowings, and gains nothing from his ground during a year of fallow; unless he may be one of the few who adopt the profitable course of a fallow crop or a crop produced whilst the ground is under a fallow. After all the loss of time, and expense of labour with hazards, the acre of *wheat*, that proud article, may put eight or ten dollars in the pocket; of which a part goes to the shop for sugar and molasses. But now, suppose the acre of *melon syrup* should yield but half of the above calculation; it then would give the farmer or (which may be better) his wife above 70 dollars—Are not these irresistible motives, impelling to make the trial!

The like, in part, may be applied to the article *coffee* from the *okra* plant. Even take only a fourth part of the calculation, near 360 pints of syrup at 10 cents, give near 36 dollars produce, almost without

without cost, and four times as much as the wheat income!—Withal, *wheat* greatly impoverishes the husbandman's ground: when *melons* cover and shelter it, so as to prevent weeds growing and running to seed, but they leave the ground mellow and in a good state of fallow.

“ *The Spirit of Commerce renders men avaricious and selfish: and a People demoralized ought to be brought back to AGRICULTURE: for, Commerce feeds the Passions; Agriculture calms them.*”

F I N I S.

Receipt for the Parmesan or Lodian Cheese.

The size of these cheeses varies from 60 to 130lbs, and depends considerably on the number of cows in each dairy.

" During the heat of summer cheese is made every day, but in the cooler months milk will keep longer, and cheese is made every other day. The summer cheese which is the best is made of the evening milk after having been skimmed in the morning and at noon, mixed with the morning milk after having been skimmed at noon. Both kinds of milk are poured together into a copper caldron, capable of holding about 130 gallons, of the shape of an inverted bell, and suspended on the arm of a lever, so as to be moved off and on the fire at pleasure. In the caldron the milk is gradually heated to the temperature of 120 degrees: it is now removed from the fire and kept quiet for 5 or 6 minutes. When all internal motion has ceased, the rennet is added—this substance is composed of the stomach of a calf, fermented together with wheaten meal and salt—and the method of using it is, to tie a piece of the size of an hazle nut in a rag, and steep it in the milk, squeezing it from time to time. In a short time a sufficient quantity of the rennet passes through the bag into the milk, which is now

to be well stirred, and afterwards left at rest to coagulate.

In about an hour the coagulation is complete, and then the milk is again put over the fire, and raised to a temperature of about 145 degrees. During all the time it is heating, the mass is briskly agitated till it separates in small lumps. Part of the whey is then taken out and a few pinches of saffron are added to the remainder in order to colour it. When the curd is thus broken sufficiently small, nearly the whole of the whey is taken out, and two pails of cold water are poured in; the temperature is then lowered, so as to enable the dairy man to collect the curd by passing a cloth beneath it, and gathering it up at the corners. The curd is now passed into a frame of wood like a bushel without a bottom, placed on a solid table, and covered by a round piece of wood with a great stone on the top. In the course of the night it cools, assumes a firm consistency and parts with its whey. The next day one side is rubbed with salt, and the succeeding day the cheese is turned, and the other side rubbed in the same manner. This alternate salting of each side is practised for about 40 days. After this period the outer crust of the cheese is pared off, the fresh surface is varnished with linseed-oil: the convex side is coloured red, and the cheese is fit for sale." *Annales de Chemie.*

Certain

" Certain it is that in Pennsylvania we do not make good cheeses of the Cheshire or Gloucester qualities : it is probable however that we could make good Parmesan.

That we should fail in the inferior, and yet succeed in the superior may seem strange, but the probability arises from the circumstance that Pennsylvania better agrees in climate with the country of the superior, the northern division of Italy, than with the country of the inferior, England.

Of this truth, there cannot be a better testimony than what is said in a volume of Young's Annals, by Zanga, resident in London, from the court of Turin, that the wheat harvest of the Milanese, where the Parmesan cheeses are made, comes on about the twenty-sixth of June, but a week before that of Pennsylvania ; whereas the harvest of England begins in no part earlier than August, and continues northerly through all the autumnal months. And from greater resemblance in climate may we not infer the greater resemblance in the animal and vegetable productions ?

It is moreover a philosophical opinion that the natural products of a warmer, are generally more highly concocted and matured, than those of a colder climate.

And in fact, by a curious analysis lately made at Paris, of twenty-two pounds of the wheat of different countries, that separable portion of the grain, which is the alimentary principle, abounded more in that of the

Pennsylvania

Pennsylvania growth than in the rest, one of them excepted ; that one sharing with it, the principle in an equal degree : And the London bakers have discovered that the American flour goes considerably further in the making of bread than the English.

As favourable to this general opinion, it has been affirmed in Devonshire that the beef of the French cattle, which have been sometimes brought over into that country for the breed, is more esteemed there than their own. And that great traveller, whom Mr. Gibbon wished had visited every quarter of the earth, thought, when here a few years since, that American beef had more nutriture still than that of his own country, France.

From these considerations and assumed facts I venture to send you for insertion in the intended new edition of your very useful book, a receipt for making the Parmesan cheese, recommended beyond all others, from the celebrated work in which it is found, the *Annales de Chemie* conducted by Chaptal, and wherein the directions are minutely plain and may be very easily followed.

It is hardly worth noticing that without some accompanying observations, as affording the probable grounds of success, no experiments whatever may be expected to be made from the receipt."

Explanation

Library
N. C. State College

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Explanation of the Cuts.

P L A T E I.

A Farm-yard, homestead and buildings; explained in the work, page 74 to 76.

P L A T E II.

Fig. I. A family laboratory, also mentioned in page 78.
n The tripartite brewing kettle. *o* A boiler. *p* Fire-place: from whence smoke to the meat above. *q* Beams suspending meat, in smoking it. *s* A register, open when the smoke is to pass through the chimney; shut when to be thrown into the room, amongst the meat at 6; an aperture through which smoke passes among the meat, when *s* is shut close; and shut, the extent of the thickness of the masonry there, when the smoke is to pass through the chimney at the top. In this house, meat may be cut up, salted and smoked: lard and tallow tried: candles and soap, made: washing, ironing, spinning, carding, dying, brewing, purifying salt, scalding milk utensils with water passing through the wall from the boiler, &c.. be performed. *Green hickory* gives the sweetest and best smoke: superior to dry hickory or locust, ash, oak; and to corn stalks; all having been tried by me in drying malt.

Fig.

Fig. II. Ground-floor of a Pennsylvania barn, as designed by a Chester county farmer. *a* Horse stable, having one small and two larger doors. It is 14 by 35 feet.—*b* Store cattle, in stalls: size 60 by 13 feet, with two doors.—*c* Beef-cattle. This side of the house, if at a bank cut down, has only one end-door. The size of the shelter 44 by 17 feet.—*d* Chaff room; having a chest for horse-feed; another with cattle meal.—*e* A long passage to feed from, 60 by 5 feet, has a box to chop potatoes in.—*f* Short passage 35 by $5\frac{1}{2}$ feet, with a trough for mixing food; and a small door at the furthermost end.—*g* Dung and litter yard.—*h* A gate.—*i* Door into potato vault; under the bridge which passes up to the thrashing and grain floor. This side of the house when against a cut down bank, has one only door for the beeves to pass, at one end of the house; and the width of their apartment is therefore wider than for the store cattle.

Fig. III. Ground floor of a proposed barn, size of fig. II. The stalls 6 feet wide; each holding two grown cattle. It has five side doors, 4 feet wide, on each front; which gives one door to 4 cattle or 2 stalls. The passage is here wider than needs be, being 9 feet. The stalls are 13 feet deep. In a roomy passage roots are cut, meal stored, &c. besides having the racks, and feeding from thence.

— *a b* Area of the bridge, if there is no bank; and it is best to give it great breadth, for admitting of a large vault, and assuring safety to the teams. This vault is 15 by 35 feet the width of the barn.

— *c* Door into the vault. Roots are let down, into it, through a funnel at the top of the bridge. It houses near 20 cattle more than the Chester county house.

Fig. IV. Elevation over fig. 3.

Two Ice-Houses selected.

No. I. is a section of the ice-houses built at Wye, as mentioned in page 304, which kept ice perfectly: but being only a cube of 9 feet of ice the mass was but 730 solid feet; and yet the house built to shelter it from sun and rain was necessarily 13 feet square.—Instead of such a house and pit, it is recommended to build,—

No. II. Under ground one half; above ground the other half; 5½ and 5½ are 11 feet, the pen of logs or timber; and 11 feet square; giving a cube mass of ice 11 feet, or 1331 feet; abundantly sufficient for free use in any family;—and yet this *house* is but 11 feet square.

a. a. The level of the ground. *c.* Open in all seasons, for giving vent to steam; the eaves also are open; —for,

Steam

Steam Ascends—Never Descends.

The mass of loose dry straw covering the ice, prevents all accession of heat on the surface of the ice, but admits of a constant ascent of heat with steam or vapour from the Pit.

i. i. Are vents nearly the length of the roof ; and other vents are the eaves, and end-door. Between the logs and the bank, all around from the bottom to a foot or two above ground, have found dry straw filled in ; for defending the ice from a continuance of moisture, at the same time that the heat ascends and carries off the vapour. Ice can no how be kept from thawing—Full one fourth of ice stored, thaws before the season for cooling liquors arrives. June, July, August, and the fore part of September are months for applying it to liquors. At the bottom of the pit are logs covering the area. On these lay faggots or brush : under them is a sink 6 inches deep.—

When family *provisions* are stored, let it be nearly in contact with the mass of ice. Fish are not to be scaled, nor opened. In a very hot time in July, a fish entire, weighing near 60lb, was laid on the bed of ice, saving that a small portion of scattering straw prevented it from quite touching the ice ; and every day it was turned : on the eighth day it was dressed, and was perfectly fresh and looked as if

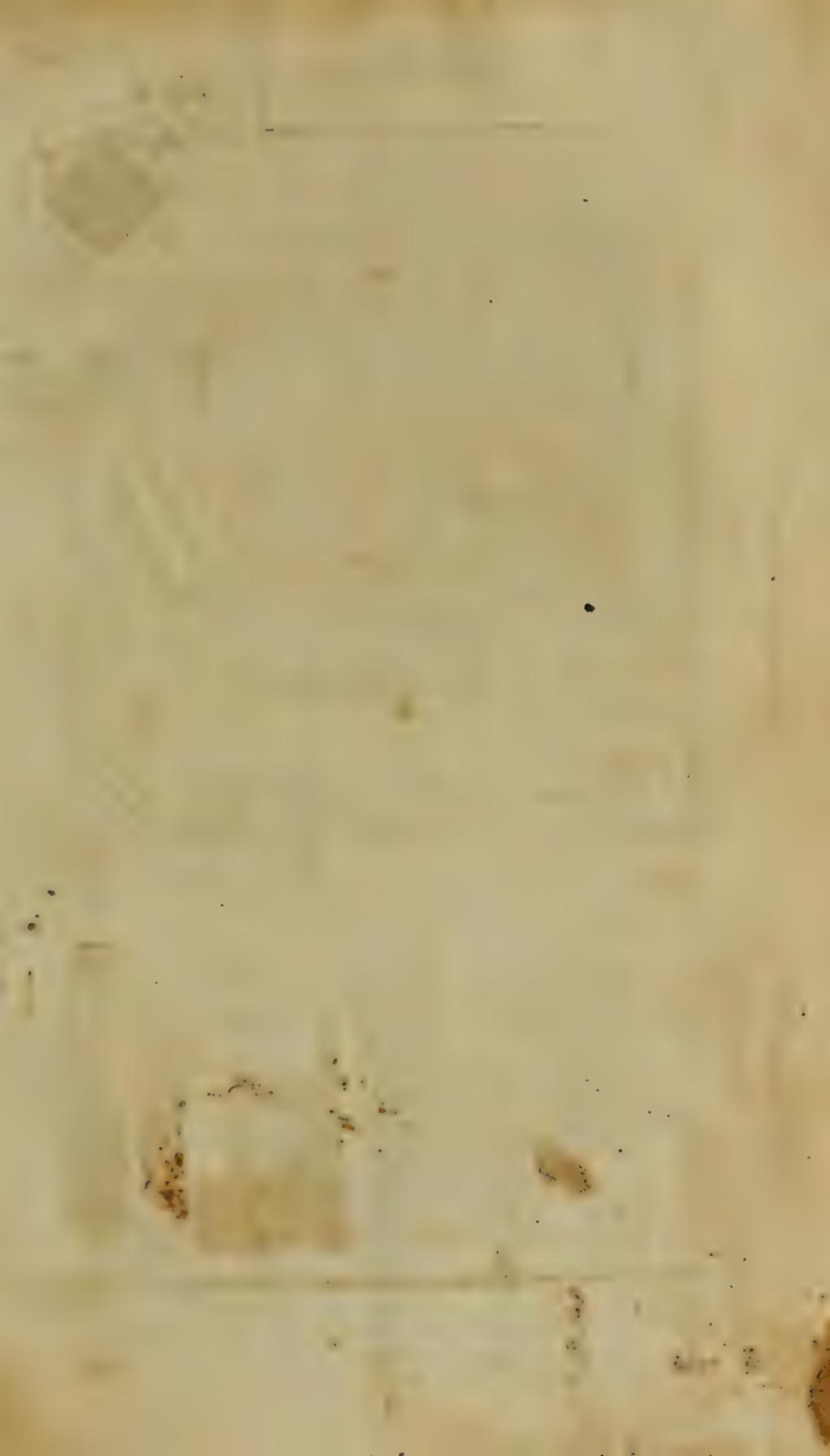


Fig. III.



Plate III.

Fig. I.

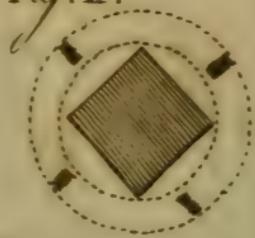


Fig. VIII.



Fig. XII.



Fig. VII.



Fig. V.



Fig. IV.

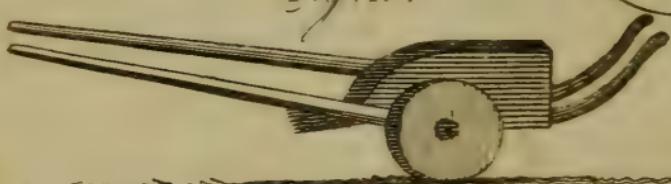


Fig. II.



Fig. II.

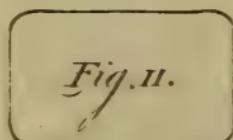


Fig. I.



Fig. III.



Fig.



if just caught. Ice gives but a little of an atmosphere.

m. m. Are covers on the straw, against rain.

P L A T E III.

Fig. I. II. Brewing vessel, 40 inches long: 20 broad: 24 deep.—*a* Division 13 inches deep: *b* 9 inches: *c* 2 inches. The dotted lines are where the perforated moveable bottoms are placed. In *a* is the *water or wort*; *b* contains the *malt*: and into *c* the warm water is pumped up from *a* and passes through; and often returned on the malt washes out its substance. The liquor is then boiled in *a*.—
a A small pump, mine is of metal. Mr. M'Cauley, Front-street Philadelphia, made my brewing vessel of copper; the shape of fig. 2. Saying that copper sheets cannot be bent angularly. At the bottom is a cock, in one side of the vessel.

Fig. III. A root steamer. *a* Brick stove, having a *pot or kettle* fixed in it. Over the pot is a *hogshead, but or cask*; or an half of either, open at top, with the bottom full of inch holes, for letting the steam up amongst the roots. Potatoes, &c. are to be washed clean in baskets, or otherwise, before steaming them.

M m

Fig. IV.

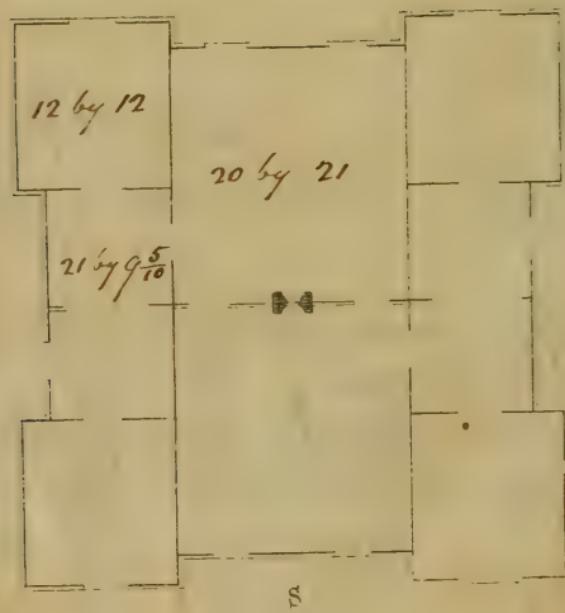
Fig. IV. Clover ripple. Wheels 16 inches diameter : box 18 inches deep : handles 3 feet long, 22 inches apart : ripple 13 inches long.

Fig. V. Bottom of the clover-seed box, mentioned page 88, with its diagonal holes and divisions.

Fig. VI. A sham blade or hoe, for stony land. *a a* 22 inches long—*b b* 14 inches wide, with mortises for side pieces, and a large one for a sheet or stanchion. A strip of iron or board is occasionally fixed on each side, for edging up a little earth to the plants. The middle mortise is to be long, for receiving a broad and strong sheet or stanchion that will carry the blade without aid from the side pieces, when occasion.

Fig. VII. A sham blade : such as I used in ground clear of stone and gravel ; gently convex to give it strength, besides that it was substantial at its back. Its side pieces were of iron, welded to the blade.

Fig. VIII. *Beds* of wheat quite flat, as they appear on sowing and covering wheat, whilst maize is on the same ground, ripening. Also *ridges* of wheat sown, as in common, after cutting off the tops of the maize plants.



7

2

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Fig. 8. Treading floor ; with horses running, promiscuously.

9. Improved floor ; with barn in the middle.

10. Mr. Singleton's floor, and house in the middle.

11. Cattle stalls. N° B. according to Mr. Bakewell. N° S. according to Mr. S. a Yorkshire gentleman.

PLATE IV.

Plan and Elevation of a country habitation, according to page 279, of the work.

PLATE V.

Fig. I. Plan of a cottage, with its yards, garden, and outbuildings.

- A. Front-yard ; 80 feet front (though shortened in the drawing). It contains, 1 the cottage ; 2 the cowhouse ; 3 manure and woodshed ; 4 the necessary ; 5 sow and pigsty.
- B. Back-yard 80 feet long (shortened as above) ; 20 or 30 feet wide.
- C. Garden 80 feet, (so shortened) by 136 feet. The whole ground in yards and garden, is about $\frac{1}{3}$ th of an acre.

If two cottages were to be built, they should be both in one, and have a stack of chimneys in the middle, for both cottages.

Fig. II. Upon a larger scale shews plans of the lower floor, of the bed-rooms upstairs—and a front view of the house.

I N D E X.

I N D E X.

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ERRATUM.

Page 56, for bare *earthen floors*—read, on bare *paved floors*.

